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Glucose level in the aspirated cystic fluid of radicular cyst, odontogenic keratocyst and dentigerous cyst

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Abstract

Background: Cystic fluid is hyperosmolar exudates that contain various proteins, carbohydrates, and glucoconjugates. This hyperosmolarity is responsible for the cyst expansion and enlargement.

Aims and Objective: To determine the glucose contents of the cystic fluid in order to assess cellular metabolism.

Materials and Method: A study was carried out on 5 cases of radicular cyst, 5 cases of odontogenic keratocyst and 5 cases of dentigerous cyst. Cystic fluid aspiration was obtained from all the three cysts for the determination of glucose level by Trinder's method.

Results: In the present study, the mean glucose content was greater in radicular cyst followed by the odontogenic keratocyst and dentigerous cyst. The p-value was found to be statically non-significant.

Conclusion: The lower glucose content of dentigerous cyst revealed minimum level of cellular metabolism than that of radicular cyst and odontogenic keratocyst.

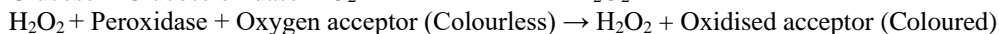
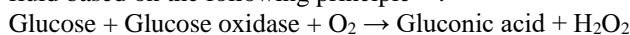
Keywords: Radicular cyst, dentigerous cyst, odontogenic keratocyst, glucose, cystic fluid

Introduction

In 1974, Kramer has defined a cyst as 'a pathological cavity having fluid, semifluid or gaseous contents and which is not created by the accumulation of pus'. Most cysts, but not all, are lined by epithelium^[1]. Odontogenic cysts include a group of osseodestructive lesions that frequently affect the jaws. These cysts can arise from epithelial components of the tooth germ, reduced epithelium of the enamel organ, epithelial rests of Malassez, remnants of dental lamina, or the basal layer of the oral epithelium^[2,3].

Dentigerous cyst (DC) is the most common developmental odontogenic cyst in the oral cavity that accounts for 20% of the developmental cysts of the jaws, and is always associated with the crown of an unerupted or impacted teeth attached to the cemento-enamel junction. It is believed to originate from the accumulation of fluid between the reduced enamel epithelium and the tooth crown, thus expanding the follicle beyond the 3 mm normal diameter^[4]. Odontogenic keratocyst is a cyst of odontogenic origin that exhibit keratinised lining and arises from the cell rests of dental lamina that accounts for 10.2% of the developmental cysts of the jaws^[5]. Radicular cysts are the most common inflammatory cysts and arise from the epithelial residues in the periodontal ligament as a result of periapical periodontitis following death and necrosis of the pulp. Radicular cyst is the most common cyst which accounts for 52.2% of all jaw cysts^[6]. The cystic fluid is a hyperosmolar exudates that contain various proteins, carbohydrates, and glucoconjugates. This hyperosmolarity is responsible for the cyst expansion and enlargement. The aim of the present study was to determine the glucose contents of the cystic fluid in order to assess cellular metabolism.

Materials and method: A study was carried out in IDST College, Modinagar in the year 2015-17 and the study groups comprised of 5 cases of radicular cyst, 5 cases of odontogenic keratocyst and 5 cases of dentigerous cyst. The study was approved by the ethical committee. In this study, cystic fluid aspiration was obtained from all the three cysts for the determination of glucose level. Trinder's method was used for the estimation of glucose level in the cystic fluid based on the following principle^[7]:-



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In the current study, 1000 µl of buffer solution was incubated with 10 µl of aspirate at 37°C for 15 minutes. The solution then appeared pink in colour that was tested in photocolormeter for obtaining the absorbance value. The glucose content was calculated by the following formula:-
Glucose (mg/dl) = Absorbance of test/ Absorbance of standard × concentration of standard of standard (mg/dl).

The concentration of standard used in the present study was 100 mg/dl. The data was analysed by using statistical software (SPSS version 19.0). Mean, standard deviation and standard error of mean were calculated. A probability value (p) of ≤0.05 was considered to be statistically significance.

Results

In the present study, majority of the subjects were males and the mean age of the subjects were 29.8 years. The mean glucose content of the radicular cyst, dentigerous cyst and odontogenic keratocyst were 108.4± 59.6, 67.05± 13.4 and 106.07± 5.65 respectively. The standard error of mean in radicular cyst, dentigerous cyst and odontogenic keratocyst were 25.7, 3.25 and 3.04 respectively. The p- value was found to be statistically non-significant (p=0.21) (Table 1).

In the present study, the mean glucose content was greater in radicular cyst followed by the odontogenic keratocyst and dentigerous cyst.

Table 1: Mean glucose content in the cystic fluid aspirates of radicular cyst, dentigerous cyst and odontogenic keratocyst

S. No	Cysts	Sample size (n)	Mean ± SD	SEM	P-value
	RC	05	108.04±59.6	25.7	0.21
	DC	05	67.05±13.4	3.25	
	OKC	05	106.07±5.65	3.04	

RC- Radicular cyst, DC- Dentigerous cyst, OKC- Odontogenic keratocyst, SD- Standard deviation, SEM- Standard error of mean.

Discussion

Odontogenic cysts are pathological entities that arise from odontogenesis associated structures such as dental lamina and cell rests. Although benign, these lesions have the tendency to destroy the surrounding bone and occasionally, tooth structure as result of cystic expansion^[8, 9]. The biochemistry of odontogenic cystic fluid is a complex mixture that results from the metabolomics and pathophysiology in these lesions. Cystic fluids show altered concentrations of biochemical components signifying that the normal physiology and cellular metabolism are affected in these pathologies. The proinflammatory mediators play a significant role in disruption of glucose homeostasis^[10-12]. The present study was done to assess the glucose contents of the cystic fluid so as to determine the cellular metabolism.

In the current study, the mean glucose content was higher in radicular cyst followed by the odontogenic keratocyst and dentigerous cyst. These results were in accordance with the study carried out by Chatterjee^[13] and Olusanya^[14].

Analysis of carbohydrates and glycoproteins in cystic fluid aspirates of non-keratinizing odontogenic cysts provide indication of nearly half the concentration of glucose than serum. Hence, glucose reduction in cystic fluid specifies that they are utilized in epithelial proliferation and maintenance of cyst^[15].

In this study, no significant differences were determined on comparing the glucose levels in cystic fluid aspiration of radicular cyst, dentigerous cyst and odontogenic cyst. The mean glucose levels were found to be greatest in radicular cyst and odontogenic keratocyst as result of their

inflammatory and neoplastic natures, respectively. Dentigerous cyst showed least glucose level revealing relatively minimal levels of cellular metabolism than radicular and odontogenic keratocyst.

Conclusion

The mean glucose content of radicular cyst in the current study was higher as compared to odontogenic keratocyst and dentigerous cyst. The lower glucose content of dentigerous cyst revealed minimum level of cellular metabolism than that of radicular cyst and odontogenic keratocyst. Further, studies on large sample size should be carried out to evaluate more accurate results.

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