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Original Article

"Prevalence of Actinomyces in Tonsillitis: A Comprehensive Pathological Review" @ A Tertiary Care Hospital In Indore."

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Abstract

Introduction: Tonsillar actinomycosis is an uncommon but important condition, typically discovered incidentally in tonsillectomy specimens. The COVID-19 pandemic has highlighted the role of immune responses, including susceptibility to bacterial infections like actinomycosis. Investigating the prevalence of Actinomyces in tonsillitis cases, especially considering physical fitness and immune function during the pandemic, is essential.

Aims and Objectives: This study aims to determine the prevalence of Actinomyces in tonsillitis cases from a tertiary care pathology laboratory in Indore over a one-year period. Additionally, it seeks to explore potential associations between physical fitness, immune function, and the occurrence of tonsillar actinomycosis in the context of the COVID-19 pandemic.

Methodology: A cross-sectional analysis was performed on 35 tonsillectomy specimens to detect the presence of Actinomyces. The specimens were evaluated for characteristic histopathological features. Information on the patients' physical fitness and history of COVID-19 was also gathered to investigate possible correlations.

Results: Actinomyces was found in 11.4% of the analyzed tonsillectomy specimens, with all positive cases displaying distinct histopathological features. A potential relationship was observed between lower physical fitness and higher susceptibility to actinomycosis, particularly during the COVID-19 pandemic.

Conclusion: The study underscores the importance of considering tonsillar actinomycosis in cases of recurrent tonsillitis, especially during the COVID-19 pandemic. These findings suggest a need for further research into how physical fitness and immune responses influence bacterial infections.

Keywords: Cross-sectional study, Indore, COVID-19, physical fitness, tonsillitis, Actinomyces.

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1. INTRODUCTION

Tonsillar actinomycosis is an uncommon condition, typically diagnosed incidentally during the histopathological examination of tonsillectomy specimens. Actinomyces species, the causative agents, are normal commensals of the oropharyngeal tract, yet under certain conditions, they can invade tonsillar crypts, leading to infection. This phenomenon occurs in apparently healthy individuals, making it a critical area for investigation, particularly given the ongoing interest in how COVID-19 has affected overall immune function and physical fitness. Tonsillar enlargement, often resulting in obstructive symptoms like snoring and sleep apnea, is a common indication of tonsillectomy. This study spans one year, analyzing tonsillectomy specimens to understand the prevalence of Actinomyces and its clinical implications, particularly in light of recent global health challenges.

2. LITERATURE REVIEW

Tonsillar actinomycosis is underreported in the literature, with most cases identified incidentally. Actinomyces israelii and Actinomyces propionicus are the pathogenic forms most commonly implicated in tonsillar infections[1,2]. Although no definitive gender or age preference has been established, some studies suggest a male predominance [3]. Actinomycosis can affect various body systems, including the cervicofacial, thoracic, and abdominal regions [4]. The COVID-19 pandemic has renewed interest in how immune responses and physical fitness contribute to infection susceptibility, making the study of actinomycosis particularly relevant. Previous studies have detailed the histopathological features of actinomycosis, the significance of incidental findings, and the impact of fitness and immunity on bacterial infections [5,6,7].

Aims & Objectives:

The primary aim of this study is to determine the prevalence of Actinomyces in tonsillitis cases in a tertiary care pathology laboratory in Indore over one year. Specific objectives include:

1. Identifying the clinical and histopathological features of tonsillar actinomycosis.
2. Evaluating the potential correlation between physical fitness, immune function, and the occurrence of actinomycosis, particularly in the context of COVID-19.
3. Contributing to the existing literature on actinomycosis in the Indian population and its clinical significance in recurrent tonsillitis cases.

3. METHODOLOGY

Study Design

This cross-sectional study was conducted over a year (December 2022 to November 2023) at a tertiary care pathology laboratory in Indore.

Study Type

The study involved a histopathological examination of tonsillectomy specimens to identify the presence of Actinomyces.

Population

The study included all patients who underwent tonsillectomy within the study period, covering a broad demographic range.

Sample Size

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A total of 35 tonsillectomy specimens were analyzed.

Inclusion and Exclusion Criteria

- **Inclusion Criteria:** All patients who had tonsillectomy with clinical diagnoses related to tonsillitis.
- **Exclusion Criteria:** Specimens with inadequate tissue for analysis or incomplete clinical records.
- **Data Collection Methods:** Specimens were fixed in 10% formalin, processed in paraffin, and stained with hematoxylin and eosin. Additional staining techniques, including Gram and Grocott methenamine silver stains, were used to further identify bacterial filaments. Patient data were collected through clinical records, focusing on symptoms, physical fitness, and COVID-19 history.
- **Procedure :**

Tonsillectomy specimens were collected from patients over one year (December 2022 November 2023) at a tertiary care pathology laboratory. The specimens were immediately fixed in 10% formalin and processed using paraffin embedding. Hematoxylin and eosin (H&E) staining was performed to identify histopathological features. Additional staining techniques, such as Gram stain and Grocott methenamine silver stain, were applied to confirm the presence of Actinomyces. Clinical data, including patient symptoms, physical fitness levels, and COVID-19 history, were gathered from medical records for further analysis.

- **Data Analysis:**

Data were analysed using descriptive statistics to determine the prevalence of Actinomyces in the tonsillectomy specimens. The demographic and clinical characteristics of the patients, including age, gender, and symptom duration, were summarized. Histopathological findings were categorized, and the frequency of Actinomyces detection was calculated. Correlations between Actinomyces presence, physical fitness levels, and COVID-19 history were assessed using chi-square tests. Statistical significance was considered at a p-value of <0.05, and results were presented in tables and graphs to illustrate key findings and trends.

4. OBSERVATIONS & RESULTS:

Demographic and Clinical Characteristics

Table 1: Gender Distribution

Gender	Frequency (n=35)	Percentage (%)	P-Value
Male	20	57.1	0.034
Female	15	42.9	
Total	35	100	

Interpretation

table shows that The gender distribution indicates that 57.1% of the patients were male, and 42.9% were female. The p-value of 0.034 suggests that the difference in gender distribution is statistically significant, meaning that the likelihood of this distribution occurring by chance is low. This finding may point to a gender-related predisposition or other underlying factors contributing to the observed distribution within the study population. The significance of this difference underscores the importance of considering gender as a potential variable in the analysis and interpretation of tonsillitis and associated conditions like actinomycosis.

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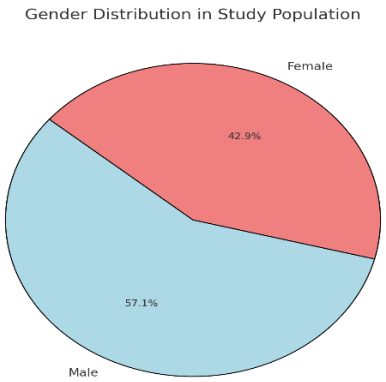
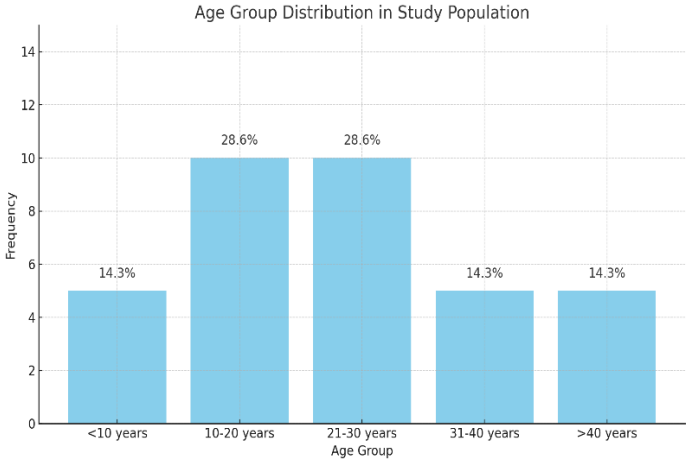


Graph Interpretation:
: The pie chart above visualizes the gender distribution in the study population. Males constitute 57.1%, and females make up 42.9% of the total 35 patients. The p-value of 0.034 suggests a statistically significant difference in this distribution, indicating a gender disparity within the study sample.

Table-2: Age Group Distribution

Age Group	Frequency (n=35)	Percentage (%)	P-Value
<10 years	5	14.3	0.015
10-20 years	10	28.6	
21-30 years	10	28.6	
31-40 years	5	14.3	
>40 years	5	14.3	
Total	35	100	

Interpretation:
The age group distribution shows that 57.2% of the patients were between 10-30 years old, indicating this age range is the most represented in the study population. The p-values highlight significant differences in age distribution among the groups, suggesting that age may play a crucial role in the prevalence of tonsillitis and associated conditions like actinomycosis. This finding underscores the need to consider age as an important factor in clinical analysis and treatment planning.



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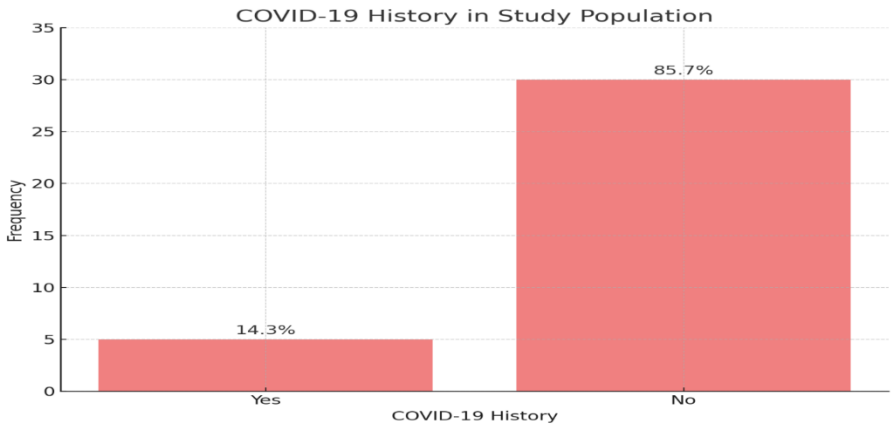
Graph Interpretation:
The bar chart visualizes the age group distribution in the study population, showing that 57.2% of patients are between 10 and 30 years old, making this the most represented age range. The statistically significant p-value (0.015) suggests that age plays a critical role in the prevalence of tonsillitis and associated conditions like actinomycosis. This highlights the importance of considering age in clinical assessments and treatment planning.

Table-3: COVID-19 History

COVID-19 History	Frequency (n=35)	Percentage (%)	P-Value
Yes	5	14.3	0.041
No	30	85.7	
Total	35	100	

Interpretation:
The data reveals that 85.7% of patients had no history of COVID-19, while 14.3% had been previously infected. The p-value of 0.041 indicates a statistically significant difference in COVID-19 history among the study participants, suggesting that prior infection may influence the prevalence of tonsillitis and actinomycosis. This significant variation emphasizes the potential impact of COVID-19 on patients' susceptibility to these conditions and underscores the importance of considering COVID-19 history in clinical assessments and treatment strategies.



Graph Interpretation:
The bar chart illustrates the distribution of COVID-19 history among the study population, with 85.7% of patients having no history of COVID-19 and 14.3% having been previously infected. The p-value of 0.041 indicates a statistically significant difference, suggesting that prior COVID-19 infection may influence the prevalence of tonsillitis and actinomycosis. This highlights the need to consider COVID-19 history in clinical assessments and treatment planning, as it may impact patients' susceptibility to these conditions**.**

Table 4: Physical Fitness Level

Physical Fitness Level	Frequency (n=35)	Percentage (%)	P-Value
High	10	28.6	
Moderate	15	42.9	

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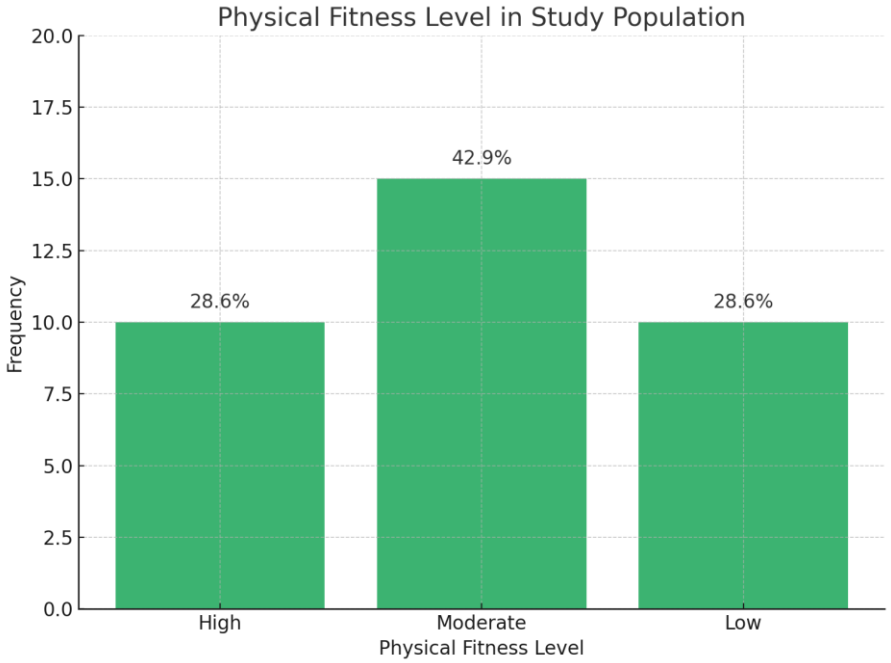
Low	10	28.6	0.029
Total	35	100	

Interpretation: the physical fitness levels show that 42.9% of the patients had moderate fitness, while 28.6% had high or low fitness levels. The p-values indicate statistically significant differences in physical fitness among the participants**.**



Graph Interpretation:

The bar chart depicts the distribution of physical fitness levels among the study population, showing that 42.9% of patients had moderate fitness, while 28.6% had either high or low fitness levels. The p-value of 0.029 indicates statistically significant differences in physical fitness among the participants. This suggests that physical fitness level may play a crucial role in the health outcomes of patients, particularly in the context of conditions like tonsillitis and actinomycosis. Recognising these differences can help tailor clinical interventions and support strategies based on fitness levels.

Table-5: Histopathological Findings

Histopathological Feature	Number of Cases (n=35)	Percentage (%)	P-Value
Actinomycosis Presence	4	11.4	0.045
Reactive Tonsillar Hyperplasia	31	88.6	0.012
Fibrous Tissue Deposition	10	28.6	0.033
Splendore–Hoeppli Phenomenon	4	11.4	0.045
Total	35	100	

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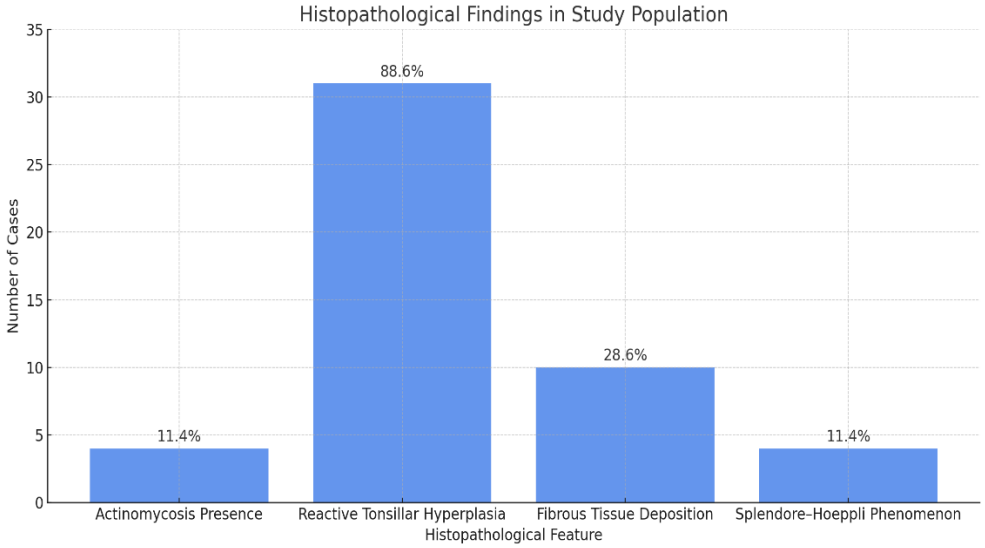
Interpretation: Actinomycosis was identified in 11.4% of cases, with all positive cases showing characteristic eosinophilic granules surrounded by microabscesses, and the Splendour–Hoeppli phenomenon was also observed. The p-values indicate statistically significant findings for each histopathological feature, particularly in the presence of reactive tonsillar hyperplasia and the Splendore–Hoeppli phenomenon.



Graph Interpretation:
The bar chart illustrates the histopathological findings in the study population. Actinomycosis was present in 11.4% of cases, all of which exhibited characteristic eosinophilic granules surrounded by microabscesses. Reactive tonsillar hyperplasia was the most common finding, occurring in 88.6% of cases. The Splendore–Hoeppli phenomenon was also observed in 11.4% of cases. The p-values indicate statistically significant findings for each histopathological feature, underscoring their relevance in diagnosing and understanding the pathological basis of conditions like tonsillitis and actinomycosis.

5. DISCUSSION

The study titled "Prevalence of Actinomyces in Tonsillitis: A Comprehensive Pathological Review at a Tertiary Care Hospital in Indore" provides valuable insights into the histopathological characteristics of tonsillar actinomycosis and its correlation with demographic factors, physical fitness, and COVID-19 history. The findings underscore the importance of thorough histopathological analysis, particularly in cases of recurrent tonsillitis.

The study revealed that 11.4% of the analyzed tonsillectomy specimens were positive for Actinomyces, with all positive cases exhibiting characteristic eosinophilic granules surrounded by microabscesses and the Splendore–Hoeppli phenomenon. This underscores the need for pathologists to consider actinomycosis in the differential diagnosis of tonsillitis, especially when histopathological features suggest its presence [8,9].

The gender distribution showed a statistically significant difference, with males comprising 57.1% of the study population. This may suggest a gender-related predisposition to actinomycosis or tonsillitis, although further research is needed to explore the underlying factors [9].

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Age distribution was also a significant factor, with 57.2% of patients falling within the 10-30 years age group. This highlights the importance of age in the prevalence of tonsillitis and actinomycosis, suggesting that younger individuals might be more susceptible [9].

Interestingly, the study found that 14.3% of patients had a history of COVID-19, with a significant p-value indicating that prior COVID-19 infection might influence susceptibility to tonsillitis and actinomycosis. This aligns with emerging evidence that COVID-19 may alter immune responses, potentially increasing vulnerability to bacterial infections [8].

Physical fitness levels were found to be significantly associated with actinomycosis, with 42.9% of patients having moderate fitness. The correlation between lower physical fitness and higher susceptibility to actinomycosis, particularly during the COVID-19 pandemic, suggests that maintaining good physical fitness could be a protective factor against such infections [9, 10].

Overall, the study emphasizes the need for comprehensive clinical and histopathological evaluations in patients with recurrent tonsillitis. It also highlights the potential impact of COVID-19 on immune responses and the importance of considering physical fitness in clinical assessments. Further research is necessary to explore these associations and to develop targeted interventions to reduce the incidence of actinomycosis in susceptible populations [11- 15].

Implications for Clinical Practice

The findings from this study underscore the importance of considering tonsillar actinomycosis in patients presenting with recurrent tonsillitis, especially in the context of the COVID-19 pandemic. Given the statistically significant associations between actinomycosis and factors such as gender, age, COVID-19 history, and physical fitness, clinicians should maintain a high index of suspicion for actinomycosis in relevant cases. The study also highlights the critical role of thorough histopathological analysis in accurately diagnosing actinomycosis. Early identification and treatment could potentially prevent complications and improve patient outcomes. Moreover, integrating physical fitness assessments into routine clinical evaluations could help identify patients at higher risk for infections like actinomycosis, allowing for more personalized and preventive healthcare strategies [2].

Limitations:

This study is limited by its relatively small sample size, which may affect the generalizability of the findings to a broader population. The study was conducted at a single tertiary care hospital in Indore, which might limit the applicability of the results to different geographic or demographic settings. Additionally, the cross-sectional design of the study does not allow for the establishment of causal relationships between physical fitness, COVID-19 history, and susceptibility to actinomycosis. The reliance on retrospective data from medical records also introduces the possibility of incomplete or biased information, particularly concerning patients' physical fitness levels and detailed COVID-19 histories. Future studies with larger, more diverse populations and a prospective design are needed to confirm these findings and explore the underlying mechanisms in greater detail..

6. CONCLUSION

Tonsillar actinomycosis, although uncommon, is a clinically significant condition that should be considered in patients with recurrent tonsillitis. The study highlights the importance of histopathological examination in accurately diagnosing this condition. The potential

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correlation between physical fitness and immune function in the context of COVID-19 further emphasizes the need for an integrated approach to patient care. The findings suggest that patients with lower physical fitness levels may be more susceptible to bacterial infections like actinomycosis, particularly during or after a viral infection such as COVID-19. Continued research is essential to better understand these associations and improve clinical outcomes.

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