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# Journal of Global Public Health

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## Contents

**Original Article**

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Volume 6 Number 1, January – June 2024

# Empowering Women: A Study of Political Participation in Indian Democracy

**Gedam Kamalakar**

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**Abstract**

Political participation of women is essential for the functioning and vitality of any democracy. In India, despite constitutional provisions and various initiatives, women's participation in politics remains significantly lower than that of men. This study aims to delve into the factors influencing women's political participation in Indian democracy and explore avenues for their empowerment in the political sphere. Through a comprehensive analysis of existing literature, data, and case studies, this article examines socio-cultural, economic, and institutional barriers that hinder women's entry into politics. Additionally, it highlights successful initiatives and policy measures undertaken at various levels to enhance women's political participation. The study underscores the importance of addressing structural inequalities, promoting gender-sensitive policies, and fostering a conducive environment for women's engagement in politics. By advocating for inclusive and equitable political representation, this research contributes to the ongoing discourse on women's empowerment and democratic governance in India.

**Keywords:** Women's political Participation; Indian Democracy; Gender Equality; Empowerment; Barriers; Initiatives; Policy Measures.

## INTRODUCTION

Women's political participation is not only a matter of fundamental rights but also a crucial element for the effective functioning of democratic governance.[1] In India, despite significant progress in various socio-economic indicators, women's representation in political decision-making remains disproportionately low.[2] This article aims to analyze the intricate dynamics of women's political participation in the Indian context, identifying barriers and exploring avenues for their empowerment. In Indian democracy, Constitution has granted equal rights to women like men and several laws have been enacted by successive governments to realize the goal of equal representation in politics, but the ground reality is different in actual terms. In real life treatment to women is based on biases and discriminations.[3] Definitely, the Indian politics does not stand for a fair status of women in practice.[4]

Women's political rights in India, there exists a wide gap between theory and practice.[5] Political participation identifies and accepts the equal distribution of liberty, status, dignity, opportunities

**Author's Affiliation:** Post-Doctoral, Department of Political Science, Dr. B.R. Ambedkar Open University, Hyderabad 500033, Telangana, India.

**Corresponding Author: Gedam Kamalakar,** Post-Doctoral, Department of Political Science, Dr. B.R. Ambedkar Open University, Hyderabad 500033, Telangana, India.

**E-mail:** kamalakarou@gmail.com

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and authority between men and women as its prime values. It is not enough if these values are only legally guaranteed and rest are only in the law books and the constitution, but are never actually practiced. Very often they have to face discrimination, injustice and dishonour in politics.[6]

### *Socio-Cultural Barriers:*

India's patriarchal societal norms and deep rooted gender stereotypes pose significant barriers to women's political participation.[7] Cultural expectations often confine women to domestic roles, limiting their mobility and political agency. Moreover, prevalent notions of 'appropriate' behavior and leadership traits reinforce gender biases, deterring women from entering politics.[8]

### *Economic Constraints:*

Economic disparities and unequal access to resources further marginalize women in political spheres.[9] Financial constraints, lack of education, and limited employment opportunities constrain women's ability to actively engage in politics.[10] Additionally, the absence of adequate support mechanisms such as childcare facilities impedes women's participation, particularly those from marginalized communities.[11]

### *Institutional Challenges:*

Structural impediments within political institutions perpetuate gender disparities in representation. Male dominated party structures, limited access to decision-making positions, and electoral violence deter women from contesting elections. Moreover, inadequate implementation of legal frameworks, such as reservation quotas for women in local bodies, undermines their effective participation.[12]

### *Initiatives and Policy Measures:*

Despite challenges, several initiatives and policy measures have been implemented to enhance women's political participation in India. The introduction of reservations for women in local governance institutions, such as Panchayati Raj institutions, has significantly increased their representation at the grassroots level. Additionally, awareness campaigns, capacity building programs, and targeted financial support schemes have been instrumental in encouraging women to enter politics.[13]

## OBJECTIVES OF THE STUDY

To understand the discrimination of women in politics.

To analyze the Poor participation of Women in party politics.

To know the increasing violence and criminalization in politics.

To suggest measures for bring in women force in politics.

## METHODOLOGY

This study is fully based on secondary data. The data was collected from books, magazines, research articles, newspapers, documents and websites.

### *Discrimination of Women in Political Aspects:*

Participation of women in political structures implies the degree of equality and freedom enjoyed by women in shaping and sharing of society to the role of women. In most societies men have always monopolized the political space. Until and unless marginalized sections of society which include women get into the political system of power, true democracy cannot be realized.

In the 1952 elections, many women contested and were given positions in the central and state cabinets or appointed as ambassadors and governors. However, after the initial enthusiasm, women`s participation in the political process declined both as voters and contestants at no time has women`s representation in Parliament and State Assemblies gone beyond 8 or 11 percent.

When India's first Lok Sabha was formed after the 1952 general elections, 4.4% of the members were female. Though the number was low reflective of the deeply entrenched patriarchy in India's society it is worth noting that India was ahead of western and seasoned democracies of the time like the US and the UK. Merely 3% of the UK's parliament and 2% of the US House of Representatives was female.

### *Women in Lok Sabha 1952-2019*

| Year | Total Seats | Women Members | Percentage to Total |
|---|---|---|---|
| 1952 | 499 | 22 | 4.4 |
| 1957 | 500 | 27 | 5.4 |

*Table Cont..*

| | | | |
|---|---|---|---|
| 1962 | 503 | 34 | 6.7 |
| 1967 | 523 | 31 | 5.9 |
| 1971 | 521 | 22 | 4.2 |
| 1977 | 544 | 19 | 3.4 |
| 1980 | 544 | 28 | 5.1 |
| 1984 | 544 | 44 | 8.1 |
| 1989 | 517 | 28 | 5.41 |
| 1991 | 544 | 36 | 6.61 |
| 1996 | 543 | 40 | 7.4 |
| 1998 | 543 | 44 | 8.1 |
| 1999 | 543 | 48 | 8.83 |
| 2004 | 543 | 45 | 8.28 |
| 2009 | 543 | 59 | 10.86 |
| 2014 | 543 | 66 | 12.45 |
| 2019 | 543 | 78 | 14 |

***Source:*** Election Commission of India

### *Minimum Representation of Women in Lok Sabha*

The representation of women in the Lok Sabha has been very poor since 1952 elections itself. For example, in 1952, there were 22 women Parliamentarians constituting only 4.4%, that is, out of a total of 499. In the 12th Lok Sabha, (1998) their number increased only to 44, that is out of the total strength of 543. In no previous elections, women's representation in the Parliament had exceeded this mark of 8.8%. This means women who constitute 50% of the total population do not even get 10% of the representation in the Parliament. In the 13th and the 14thLok Sabha Elections also representation of women is less than 10%. In the 15th Lok Sabha Elections representation of women is less than 11%. Two things are clear from the above table. There is male domination in Indian politics and almost all political parties give very little participation to women in election despite their vocal support for 33 per cent reservation of seats for women in Parliament and Provincial Legislatures. Women have made initiatives in political participation but they have not been accepted in politics. We can conclude from the analysis of the table above that women lag behind their male counterparts in politics even in 21st century.

### *Poor participation of Women in party politics:*

Not only in the legislative bodies but even within the framework of the political parties also the participation of women is very poor. Political parties are still male-dominated and unwilling to give sufficient representation to women. For example, in 2001 the Congress party had only 3 women in its 20-member working Committee. In the BJP working Committee, out of 75 members there were only 8 women, and in its 650-member National Council, there were only 150 women. The Communist Party Marxists had only 12 women in its 150-member National council, and 3 women in its 21-member National Executive. At the state and district levels also the picture of this representation is more or less the same. No political party is ready to give representation to women in proportion to their strength in the population.

### *Increasing Violence and criminalization in politics:*

Political corruption, criminalization of politics, erosion of political values, disappearance of political decency, instability, lawlessness, terrorism and confusion have been increasing in our public life since 1980s. This state of confused political situation has discouraged women from taking active role in politics. Besides this the cultural constructions of gender roles, in the absence of adequate support structures in the family and domestic responsibilities cannot completely be done away with, once she becomes a people`s representatives.

### *Women's Political Participation Challenges*

1. **Socio-Cultural Barriers:** Traditional gender roles and social expectations often prevent women from actively participating in politics. Cultural norms dictate that the main role of women is in the family and may limit their opportunities to participate in political activities.
2. **Limited access to education:** In many parts of India, especially in rural areas, women have limited access to education. Lack of education can prevent them from effectively participating in the political process, such as understanding politics, running for office, or voting.
3. **Lack of financial resources**: Political participation often requires financial resources, such as campaign financing or membership fees for political parties. Women, especially those from marginalized communities, may lack the financial resources to actively participate in politics.

4. **Political violence and intimidation:** Women in politics often face threats of violence and intimidation from their own communities or from rival political groups. This can prevent women from seeking political office or engaging in political activism.
5. **Under-representation in political institutions:** Despite constitutional provisions and affirmative action policies, women are under-represented in Indian political institutions such as Parliament, state legislatures and local bodies. These errors point to persistent barriers to women's political participation.
6. **Party politics and patriarchal structure**: Political parties in India are often dominated by male leaders and operate in a patriarchal structure. This can make it difficult for women to join party ranks or find support for their political ambitions.
7. **Media bias and stereotyping:** female politicians in India often face bias coverage and stereotyping in the media, which can damage their image and effectiveness as political leaders. A media persona can focus more on their appearance or personal life than their political achievements and ideas.
8. **Legal and Institutional Challenges:** Although the legal framework promotes gender equality, enforcement mechanisms are weak and can lead to discrimination against women in politics. Institutional biases and bureaucratic obstacles can hinder women's political participation.
9. **Gender and intersectional discrimination:** Intersectional discrimination based on caste, religion or ethnic factors can exacerbate the challenges of women in politics, especially from marginalized communities.
10. **Lack of support infrastructure:** Women often lack support infrastructure, such as childcare facilities or transportation options, needed to balance political responsibilities and domestic obligations.

### *Findings and Suggestions*

Women can be brought at par with men only after providing them in practice all social, economic and political equality and equal rights and through educational empowerment. It is necessary for the protection of women's human rights that every woman is educated, made aware of available legal rights and in practice she is provided with her due legal rights. Education is the best instrument of bringing awareness in any society and by including them in the mainstream of development.[14] At the same time women have to come forward to struggle for their rights. In fact, the struggle for women's rights is a struggle for human welfare and democracy. Democracy could only be strengthened after women empowerment. The establishment of real democracy in India is only possible when we bring men and women at equal pedestal in social, economic and political spheres. Democracy in the family will establish social and economic democracy which can establish and empower in real terms true political democracy in the country.[15]

Fundamentally India is a male dominant society where in all privileges were male oriented. Women were denied basic rights and discrimination is obvious in every walk of life. Indian women, by and large, educationally backward, socially and economically dependent, she was assured, the unique pride of the mother hood of man, and unparalleled influence in the shaping of the society, has had lived through suppression, exploration and ill treatment at the hands of man.[16]

Despite governmental concern and official attention to these issues of women, a large proportion of women living in the country both, in the rural and urban areas, continue to experience and suffer from acute inequalities, deprivation, exploitation and violence. Official and unofficial data collected and various indicators applied to assess the position of women, reveal that only a small number of women have been benefited from these measures. Majority of women will occupy a lower status than men in power, wealth and opportunity. Therefore, more efforts are made to bring in women force in policy-making and public life in the years to come.[17] Women should also make use of the opportunities and provisions provided to them and try to come to the mainstream both in administration and public life. Moreover, it is the moral obligation of all including the Media, Educational Institutions, NGO, Governmental Machineries, Feminists, Political and Socio-Religious Leaders to fight injustice and uphold individual dignity.

## CONCLUSION

Efforts to empower women politically are integral to fostering inclusive and representative democracies. Addressing socio-cultural, economic, and institutional barriers is essential for enhancing women's political participation in India. By promoting gender sensitive policies, mainstreaming

gender perspectives, and fostering an enabling environment, Indian democracy can harness the full potential of women as active agents of change and progress. It is imperative for policymakers, civil society, and other stakeholders to collaborate in advancing gender equality and ensuring women's meaningful participation in political processes.

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# Association of Tobacco Smoking with Periodontal Health and Early Loss of Teeth among Adult Population in Visakhapatnam

**K Rashmika[1], L Vamsi Krishna Reddy[2], R Yashwanth Sai[3,] Ravada VSSK Kinneresh[4], B Suma Priyanka[5], Vejandla Vamsi Krishna[6]**

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**Abstract**

***Background:*** Tobacco use is a major modifiable risk factor for health which was found to affect dental health by accelerating the onset, severity, and progression of periodontal disease.

***Aim and Objectives:*** To assess the association of tobacco smoking with periodontal health and early loss of teeth among adult population of Visakhapatnam

***Material and Methods:*** Data was collected using a face to face interview of a validated fagerstorm questionnaire and Periodontal status from WHO oral health assessment form 2013 to assess the periodontal status of the participants.Based on Purposive sampling technique and the desired sample size was 430 was obtained.

***Results:*** Out of 430 participants, 244 (56.7%) were males and 18 6(43.3%) were females. A population of 244 (187males and 57 females) members smoke their first cigarette within 5 mins of waking up, whereas 18 6(129 males and 57 females' members smoke their first cigarette within 6 to 30 minutes after waking up in the morning. 187 (29.8%) males and 58 (13.5%) females smoke 21 to 30 cigarettes per day. There is a significant change in the loss of attachment based on the scoring criteria the pocket depth is seen upto 4-5 MM in majority of the participants (1.21±0.17). Most of the tobacco users (73, 44.5%) had chronic periodontitis with periodontal pocket of 4-5 mm and attachment loss of 6-8 mm (79, 48.2%) followed by periodontal pocket of 6-8 mm (31, 18.9%) and clinical attachment loss of 4-5 mm (28, 17.1%).

***Conclusion:*** The results of the current study demonstrated that smoking negatively affects periodontal and gingival health. Preventing smoking will improve the oral and overall health related quality of life.

**Keywords:** Tobacco Smoking; Periodontal Disease; Smokers.

**Author's Affiliation:** [1]Private Practitioner, [2]Professor and Head, [3]Associate Professor, [4]Senior Resident, Department of Public Health Dentistry, Government Dental College and Hospital, Asarwa, Ahmedabad 380016, Gujarat, India, [5]Assistant Professor, Gitam Dental College & Hospital, Visakhapatnam 530045, Andhra Pradesh, [6]General Physician & Ex Research, Department of Public Health Dentistry, All India Institute of Medical Sciences, New Delhi 110029, India.

**Corresponding Author: K Rashmika,** Private practitioner, Government Dental College and Hospital, Asarwa, Ahmedabad 380016, Gujarat, India.

**E-mail:** rashmikakolikipudi96@gmail.com

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## INTRODUCTION

Tobacco is in charge of the newest plague of the twentieth century, and its utilization is still expanding around the world. Out of 930 million WORLDWIDE tobacco users, 182 million smokers abides in India. World Health Organization (WHO) appraisal evaluated that by 2020, tobacco related demise may surpass 1.5 million every year or 13% of all passing in India.[1] Nicotine dependence includes parts of both mental and physical dependence. Tobacco use is a major modifiable risk factor for health, which is one of the leading causes of a range

of cardiovascular and respiratory disorders in addition to various cancers in the body.[1]

Smoking cigarettes can have numerous unfriendly consequences on oral and dental wellbeing. Smokeless tobacco is known to cause tumors of the mouth, lip, tongue, and pancreas along with majority leading to destruction of gum tissue, causing periodontal malady.[1]

Pindborg (1947) was one of the primary specialists to examine the connection between tobacco use and periodontal disease.[1] Furthermore, smoking was found to affect dental health by accelerating the onset, severity, and progression of periodontal disease, contributed by the development of a favorable milieu for periodontal pathogens inside the oral cavity.[2] Tooth loss impairs the quality of life, often substantially and affects the well-being of the person. Missing teeth can interfere with chewing ability, diction, and esthetics. Low self-esteem related to tooth loss can hinder an individual's ability to socialize, hamper the performance of work and daily activities.[3] The major factors that persist to encourage people to use smokeless form of tobacco are its low price, ease of purchase, and the widely held misconception of purported medicinal value in curing toothache, headache, and in decreasing hunger.[4] It has been demonstrated that tobacco smoking can result in an increased loss of periodontal attachment as well as alveolar bone. It has also been shown that outcomes of periodontal therapy are less favourable in smokers than in non-smokers.[5] The loss of many teeth often reduces the quality of life; embarrassment and self-consciousness limit social interaction and communication.[6] Because of chewing problems and decreased masticatory function, a limitation in food selection may occur, resulting in nutritionally poor diets. Poor nutrition might contribute to an increased risk of several systemic diseases such as cardiovascular diseases and hypertension. Tooth loss may be a significant problem related to general health and the quality of life.[6] About 2.3% of the global population representing 158 million people worldwide was edentate in 2010. Between 1990 and 2010, the global age standardized prevalence of severe tooth loss in the entire population decreased from 4.4% to 2.4%, a 45% decrease.[6] The global age-standardized incidence rate of severe tooth loss in 2010 was 205 cases per 100,000 persons year. A significant decrease (45%) from the 1990 incidence rate of 374 cases per 100,000 persons years.[6]

However, in India, very few studies have been there evaluating the association of tobacco smoking with periodontal health and early loss of teeth in adult population.[6] The habit of tobacco use which was prevalent in approximately one-third of the adult population worldwide occurs either in the form of smokeless tobacco. In addition to the chronic diseases mentioned earlier, tobacco related habits have also been identified as major behavioural risk factors for a variety of oral heath related conditions, such as periodontal diseases and tooth loss.[7]

However, tooth loss was not only a disease related problem, as it could also be considered as a condition associated with socioeconomic status. It was well documented in various studies that smoking increases the risk for tooth loss among the middle aged and older population.[7]

The men who smoke cigars were at high risk of having alveolar bone loss, and persons who smoke cigars or pipes had higher number of missing teeth than non-smokers.[8]

The people in South Asian consumes tobacco in various forms and in North India (beedis are products used commonly (tobacco wrapped in the dried leaves (Bauhinia racemose) of for cigarettes for smoking.[9]

Hence the present study will be conducting to assess the association of tobacco with periodontal health and early loss of teeth among adult population in Visakhapatnam.

## AIM

To assess the association of tobacco smoking with periodontal health and early loss of teeth among adult population of Visakhapatnam.

## OBJECTIVES

1. To assess the prevalence of tobacco smoking among adult population of Visakhapatnam using The Fagerstrom test for nicotine Dependence smokeless tobacco (FTND-ST).
2. To assess the periodontal health status of the tobacco smokers among the adult population of Visakhapatnam using CPI index.
3. To assess the prevalence of early loss of teeth in the tobacco smokers among the adult population of Visakhapatnam using 2013 WHO proforma.
4. To find association between tobacco smoking, periodontal health status and early loss of teeth among the adult population of Visakhapatnam.

## METHODOLOGY

A descriptive cross-sectional study was carried out from June 2022 to November 2022 to assess the association of tobacco with periodontal health and early loss of teeth among adult population in Visakhapatnam." using WHO oral health assessment form 2013 and self-administered, pretested, validated fager storm questionnaire.

## STUDY SETTING

Community dental outreach programmes conducted by Dental institute in Visakhapatnam district, Andhra Pradesh, India.

### *Study Population*

The survey was carried out among 35-44 years old tobacco smoking people attending community dental outreach programs conducted by Dental institute in Visakhapatnam District. This age group was focused on as it is the WHO recommended standard monitoring group for oral health conditions of adults.

### *Study Design*

A Descriptive cross-sectional study was conducted the association of tobacco with periodontal health and early loss of teeth among adult population in Visakhapatnam. 35–44 year-old adults attending outreach programs in Visakhapatnam" using WHO oral health assessment form 2013 and self-administered, pretested, validated questionnaire.

### *Training and Calibration of Examiner*

The clinical examination of all the study participants was done by a single examiner with the help of a recorder. Prior to the study the examiner was trained to record the questionnaire and WHO criteria (2013) for adults in the department of Public Health Dentistry, Anil Neerukonda Institute of Dental Sciences.

### *Pilot Study*

A pilot study was conducted prior to the main study among a convenience sample of 30, among 35-44 year-old adults attending community outreach programs conducted by dental institution, Visakhapatnam district in an endeavour to standardize the methodology with diagnostic instruments, criteria and data recording procedure. The prevalence of periodontal status obtained was 78.5%.

### *Sample Size*

Sample size determination was based on the periodontal status prevalence obtained from pilot study (70%).

Formula used for estimation of sample size is:

$$\text{Sample size} = \frac{z^2pq}{L^2} = \frac{4pq}{L^2}$$

p = prevalence 78.5% (78.5/100=0.78)

q = 1- p = 0.78)

L = allowable error 0.04

z = 1.96 ~ 2 for 95% confidence interval for descriptive study.

$$\text{Sample size} = \frac{4\times0.78\times 0.22}{0.04\times0.04} = 429.$$

The estimated sample size was 429 based on the prevalence rate of 78.5%.

After substitution of values the sample size arrived at 429 which was rounded off to 430.

### *Sampling Method*

Approximately 40 outreach programs had been conducted from which smokers who were in between the age group of 35-44 year old were selected by using Purposive sampling method.

### *Inclusion Criteria*

1. The participants attending the outreach programs on that day will be included in the study.
2. The participants who gives the informed consent will be included in the study.

### *Exclusion Criteria*

1. Uncooperative participants were excluded from the study.
2. The participants who attend the outreach programs and would not give informed written consent had been excluded in the study.

### *Ethical Clearance*

The protocol for the study was submitted before Institutional ethics committee and request for ethical clearance was made. The ethical clearance was obtained on 18-01-2021 with reference number ANIDS/IEC/2021015.

### *Obtaining Permission from Participants*

The study procedure was explained to the participants in local language and signed consent form was obtained.

### *Data Collection*

1. Fagerstorm Questionnaire
2. WHO Oral health assessment form 2013 (Adults)

### *Questionnaire*

A Pretested, validated, self-administered questionnaire was given to the 35-44 year-old smoking adults who attended community outreach programs

### *Examiner Position and Examination*

The examinations were carried out in a well - illuminated day light by a trained and calibrated examiner with the help of a recorder. Type III Dental examination of the study participants was carried out under natural light. The subjects were examined by making them sit on a chair, with his or her neck extended, and the examiner standing opposite to them. The study was conducted in two phases. First a self-administered, pre-tested questionnaire was distributed among the 35-44 year old adults who had smoking habits, attending the community outreach programs in Visakhapatnam district in both English and Telugu to assess the association of tobacco smoking with periodontal health and early loss of teeth among adult population of Visakhapatnam. Second, they were examined orally using WHO criteria 2013. The examiner was accompanied by a trained assistant for recording the questionnaire and proforma.

### *Procedure*

A self-administered, pre-tested questionnaire was distributed among 35-44 years old adults attending community outreach programs in Visakhapatnam district in both English and Telugu to assess the association of tobacco smoking with periodontal health and early loss of teeth among adult population of Visakhapatnam. Outreach programs had been conducted in Visakhapatnam districts.

The clinical examination of each study participant was done at community outreach programs

Oral health education was provided to the participants attending outreach programs after completion of examination.

## STATISTICAL ANALYSIS

- The data collected was entered in Microsoft Excel Software by the examiner. The entered data were exported to SPSS (Statistical package for social science) for statistical analysis.
- Statistical tests were done using SPSS 25.0
- The level of significance was set at $p< 0.05$.

**Table 1:** Gender wise distribution details

| Gender | N (%) |
|---|---|
| Males | 244 (56.7%) |
| Females | 18 6(43.3%) |

**Table 1**: Depicts the distribution based on gender of participants who were smokers in which majority of them were males 244 (56.7%) and 186 (43.3%) were females.

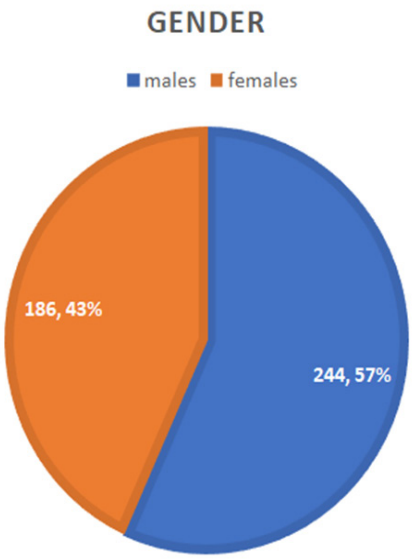
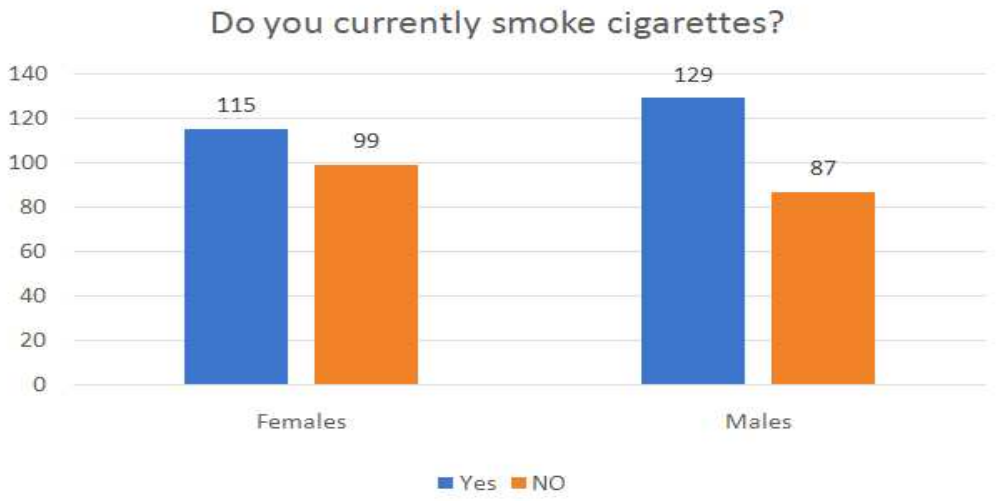



**Fig. 1: Gender**

**Table 2:** Fagerstorm questionnaire

| Questions | Option | Females N (%) | Males N (%) | Chi square | p-value |
|---|---|---|---|---|---|
| Do you currently smoke cigarettes? | Yes | 115 (26.7%) | 129 (30.0%) | 1.568 | 0.210 |
| | No | 99 (23.0%) | 87 (20.2%) | | |
| How soon after you wake up do you smoke your first cigarette? | Within 5 mins | 57 (13.3%) | 187 (43.5%) | 2.875 | 0.090 |
| | 6-30 mins | 57 (13.3%) | 129 (30.0%) | | |
| | 31-60 mins | – | – | | |
| | After 60 minutes | – | – | | |
| Do you find it difficult to refrain from smoking in places where it is forbidden (e.g., in church, at the library, in the cinema)? | No | 187 (43.5%) | 57 (13.3%) | 2.875 | 0.90 |
| | Yes | 129 (30.0%) | 57 (13.3%) | | |
| Which cigarette would you hate most to give up? | The first one in the morning | 72 (16.7%) | 172 (40.0%) | 11.375 | 0.001* |
| | Any other | 29 (6.7%) | 157 (36.5%) | | |
| How many cigarettes per day do you smoke? | 10 or less | 57 (13.3%) | 187 (43.5%) | 3.296 | 0.69 |
| | 21 to 30 | 58 (13.5%) | 128 (29.8%) | | |
| | 11 to 20 | – | – | | |
| | 31 or more | – | – | | |
| Do you smoke more frequently during the first hours after waking than during the rest of the day? | No | 63 (14.7%) | 123 (28.6%) | .475 | 0.490 |
| | Yes | 75 (17.4%) | 169 (39.3%) | | |
| Do you smoke when you are so ill that you are in bed most of the day? | No | 181 (42.1%) | 63 (14.7%) | .746 | 0.388 |
| | Yes | 131 (30.5%) | 55 (12.8%) | | |

**Table 2** shows the response of the participants for the fagerstorm questionnaire depending on the gender, majority of the male patients 129 (30.0%) currently smoke cigarette among them 187 (43.5%) participants smokes their first cigarette Within 5 minutes after waking up in the morning. 172 (40.0%) of male participants and 72 (16.7%) female patients hate to give up the first one in the morning.




**Graph 1:** Shows the no.of participants who currently smoke cigarettes.

**Table 3**: Correlation Between Age and Loss of Attachment for the Index Teeth.

| Loss of Attachment | | 16/17 | 11 | 26/27 | 36/37 | 31 | 47/46 |
|---|---|---|---|---|---|---|---|
| | N | 430 | 430 | 430 | 430 | 430 | 430 |
| Age (35-44 Years) | Pearson Correlation | 0.23 | .338** | .628** | .577** | .380** | .560** |
| | Significance | 0.000* | 0.000* | 0.000* | 0.000* | 0.000* | 0.000* |

**Table 3** Shows that there is a positive correlation between age and loss of attachment with a statistical significant difference.

**Table 4:** Mean Values of Bleeding on Probing and Periodontal Pockets

| | N | Mean ±S.d | St.error | T value | P-Value |
|---|---|---|---|---|---|
| **Pocket** | 430 | 1.31±0.25 | 0.012 | 108.448 | **0.000*** |
| **Bleeding** | 430 | 1.7±0.20 | .010 | 170.16 | **0.000*** |

P<0.05* is significant, p<0.001- highly significant

**Table 4:** Shows the mean value of Bleeding on probing **(**1.7±0.20) and pocket depth (1.31±0.25), which were found to be statistically significant.

**Table 5:** Shows The Mean and Standard Deviation of Scoring Criteria of Loss of Attachment

| Loss of attachment | N | MEAN ±S.D | St.error | P-value |
|---|---|---|---|---|
| SCORE 1 (0-3mm) | 124 | 1.39±0.21 | 0.019 | **0.000*** |
| SCORE 2 (4-5mm) | 290 | 1.21±0.17 | 0.009 | **0.000*** |
| SCORE 9 (sextant excluded) | 15 | **2.11±0.008** | **0.002** | **0.000*** |

P<0.05* is significant, p<0.001- highly significant

**Table 5:** shows Among the population of 430, HIGHEST score is seen among 290 participants with score 2 (4-5MM) of pocket depth, followed by score 1 among 124 population (0-3MM)

**Table 6:** Shows The Mean Values of Scoring Criteria of Bleeding on Probing

| Bleeding | N | MEAN ±St. Deviation | St.error | P -value |
|---|---|---|---|---|
| Absence | 120 | 1.62±0.11 | 0.010 | **0.000*** |
| Presence | 310 | 1.66±0.19 | 0.011 | **0.000*** |

P<0.05* is significant, p<0.001-highly significant

**Table 7:** Correlation Between Fagerstorm Nicotine Dependence and Periodontal Pocket

| Spearman's Correlation coefficient | | N | Fagerstorm nicotine dependence | Periodontal Pocket | P-value |
|---|---|---|---|---|---|
| | Smoking | 430 | 1.000 | 0.096 | **0.04*** |
| | Periodontal pocket | 430 | 0.096 | 1.000 | |

P<0.05* is significant, p<0.001-highly significant

**Table 7** shows the positive correlation between tobacco smoking and Periodontal Pockets, which was statistically significant

## DISCUSSION

Smoking is the primary cause of many oral problems, including periodontal disease. Tobacco is consumed by smokers to regulate arousal levels and to manage their mood. It also enhances focus and performance on several tasks. One of the components of tobacco that leads to addiction is nicotine. Because it makes people feel good, the addictive drug nicotine also helps people feel less stressed and anxious. When nicotine is absorbed by cigarette smoke, it enters the bloodstream quickly through the lungs and travels to the brain in a matter of seconds.[10]

There are a number of risk factors that contribute to an increased prevalence of periodontitis, including tobacco use, education and socioeconomic position, diabetes mellitus, access to health care, and oral hygiene practises.[15] Smoking, stress, and obesity are examples of risk factors that are known to enhance the susceptibility to periodontal disease and are therefore thought of as modifiable variables according Ainamo et al.[11,12]

In a wide range of populations, there is a clear link between tobacco use and smoking practices and periodontal diseases.[13] Recent research has definitely established a link between smoking exposure and both the prevalence and seriousness of periodontal disease.[14] For a good diagnosis, smoking is a necessary component, and in clinical practise, direct measurement of smoking history is of utmost significance. However, it is unknown, how smoking affects the stages of periodontitis.[15] The Fagerstorm Questionnaire is a helpful tool for determining who has the highest consumption of tobacco products and may consequently be more susceptible to disease.[16]

A study conducted by p. Axelsson, J. and J. Lindhe suggested that there was a relationship between loss of periodontal attachment and the duration of smoking among the subjects.[17]

This present study is to know the correlation between smoking and periodontitis stage So, the present descriptive cross-sectional study was planned to know the association of tobacco smoking with periodontal health and early loss of teeth among adult population in Visakhapatnam which had been conducted based on the WHO survey age group i.e; 35-44 years, where the smoker's status had been recorded by using Fagerstorm Questionnaire (FTND).

In the present study the participants were selected based on purposive sampling who are attending the dental outreach programs conducted by the dental institution and the total sample obtained was 430 out of which 244 (56.7%) were males and 186(43.3%) were females, this is similar in line conducted by Ojima et al and Shabana Begum SK et al that men (53.3%, 64.29%) had a significantly higher smoking rate than women (15.5%).[6,3]

This study shows that majority of the participants currently smoke cigarettes (129 males and 115 females). A population of 244 (187 males and 57 females) members smoke their first cigarette within 5 mins of waking up, whereas 186 (129 males and 57 females' members smoke their first cigarette within 6 to 30 minutes after waking up in the morning. Similarly, study was done by Dahal et al showed that majority of the participants consumed tobacco were males (79%) when compared to females (6%).[10]

In the present study, 186 (57 males and 129 females) Participants found difficult to refrain from smoking in places where it is forbidden (e.g., in church, at the library, in the cinema), where majority of them 244(57 males and 187 females) can refrain from smoking in places where it is forbidden.

Among total population 172 (40.0%) males and 72 (16.7%) females participants hate most to give up the first cigarette in the morning when compared to the cigarettes that are smoked in the rest of the day, 157 (36.5%) males and 29 (6.7%) females.

In the present study 187 (43.5%) males and 57 (13.3%) females participants smoke 10 or less cigarettes, whereas 187 (29.8%) males and 58 (13.5%) females smoke 21 to 30 cigarettes per day.

Among 430 participants majority of the participants smoke frequently during the first hours after waking than during the rest of the day i.e; 169 (39.3%) males and 75 (17.4%) females, this might be due to (urgency of restoring the level of cigarette nicotine after abstinence during sleeping) and maintaining the level of nicotine during waking.[18,19]

This present study showed that there is a correlation between age and loss of attachment as the age increases the loss of attachment also increases though smoking is the risk factor in this study it showed a positive correlation between age and attachment loss. This is in concordance with study conducted by Syeda et al. shows the prevalence of periodontal disease is higher in older people, which is another factor contributing to its rise. This might be due to the relationship between age and periodontal disease as to people in their 40s and 50s has less attachment loss, where it is more apparently seen among those aged 60 to 90.[20] Though the sample size was 35-44 year

old in addition to the smoking as a risk factor the loss of attachment showed the significant change. The World Health Organization advises that risk factors for periodontal disease include stress, socioeconomic status, and smoking.

This present study shows the mean values of bleeding on probing (1.7±0.20) and periodontal pockets (1.31±0.25,) where there is decrease in bleeding on probing which is similar to the study conducted by Velidandla et al which found that smokers had less bleeding on provocation when compared to non-smokers, it might be due to usage of nicotine, which causes vasoconstriction of peripheral blood vessels such as in the forearm, skin and hands,[21] which is also similar to the studies conducted by Rajkarnikar and Acharya's hospital based study revealed that the majority of tobacco users smokers (84.5%), chewers (100%) and dual users (86.4%) had increased periodontal deterioration.[22]

According to a study by Pradhan et al. conducted on a rural Nepali population, both light and heavy smokers have deeper periodontal pockets than nonsmokers.[23]

According to the present study showing the significant changes in the loss of attachment based on the scoring criteria the pocket depth is seen up to 4-5 MM in majority of the participants (1.21±0.17) which is similar to the studies conducted by Dahal et al showed that most of the tobacco users (73, 44.5%) had chronic periodontitis with periodontal pocket of 4-5 mm and attachment loss of 6-8 mm (79, 48.2%) followed by periodontal pocket of 6-8 mm (31, 18.9%) and clinical attachment loss of 4-5 mm (28, 17.1%). Very few (24, 14.6%) tobacco users had healthy periodontium.[10] It has been show by epidemiological studies that smoking has a marked influence on prevalence, extent, and severity of periodontitis Holm et al.[24] Other investigations have demonstrated that smokers experience higher levels of some clinical measures than non-smokers, including probing pocket depth and clinical attachment loss. It's important to note that smokers exhibit less bleeding during probing and less inflammation when plaque builds up compared to non-smokers.[25,26]

This study shows that the number of teeth lost by participants with high dependency (8+) scores was largest (147(71%), while the number of teeth lost by people with low to moderate dependence was lower 19(52.8%), which is similar to the study conducted by. K Tanaka et al,[27] A prospective research of Swedish women aged 38 to 60 found a substantial positive correlation between daily cigarette consumption and the number of teeth lost over a 12-year follow-up period. Additionally, a cross-sectional study conducted in the US found that the mean number of missing teeth among current, former, and non-smokers was 5.1, 3.9, and 2.8, respectively. The prevalence of tooth loss among Japanese men aged 20 to 59 years was significantly positively linked with active smoking for more than 10 years or ingesting at least 11 cigarettes daily compared to non-smokers.[28] It is important to perform numerous studies, such as the National Oral Health Survey, to better understand the connections between the risk factors for periodontal diseases. The strengths of this study were Health education and tobacco cessation counselling was given for all the participants. Integrating two different types of data collecting instruments in this study, makes the research more purposeful. After screening of the patients in dental outreach programs the participants who are in need of treatmentwere referred to our institution and treatments were done. The present study was limited by cross-sectional design which reports the presence or absence of conditions at that particular time. This study was conducted on lesser population so that Generalizability cannot be done. This study can lead to social desirability bias.

## CONCLUSION

Smoking is the primary cause of many oral problems, including periodontal disease. It has been demonstrated that tobacco smoking can result in an increased loss of periodontal attachment as well as alveolar bone. In the present study the participants were selected based on purposive sampling who are attending the dental outreach programs conducted by the dental institution and the total sample obtained was 430 out of which 244 (56.7%) were males and 186 (43.3%) were females. The results of the current study demonstrated that smoking negatively affects periodontal and gingival health. Smoking is highly linked to chronic periodontitis, and the relationship is dosage dependant manner. Health education, tobacco cessation, and motivating initiatives should be prioritised at the national and international levels in order to prevent and control tobacco induced oral illnesses. As a result, public awareness campaigns should be developed to educate the general population in order to discourage such behaviours. It is critical to create preventive interventions to limit tobacco consumption. Preventive interventions,

particularly those aimed at the adult population, must be implemented on an emergency basis. This is especially crucial for emerging countries like India, which have become the primary targets of international tobacco companies' advertising and promotional propaganda. Preventing smoking will improve the oral and overall health related quality of life.

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# Understanding and Addressing Vaccine Hesitancy: A Comprehensive Analysis

**S. Akansha[1], Arshia Pathania[2], Anamika Choudhary[3], Sahil Thakar[4], Sahil Negi[5]**

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**Abstract**

Vaccine hesitancy is the disinclination or turndown to vaccinate despite the vacuity of vaccines. It is said that by misinformation, mistrust in authorities, artistic beliefs, and socioeconomic difference. It's a complex and multifaceted issue that requires a combined trouble to address. By understanding the factors contributing to hesitancy, addressing misinformation, erecting trust, and enforcing targeted interventions, we can promote vaccine acceptance and cover public health. It's imperative that we work together to insure that vaccines remain one of the most effective tools in precluding contagious conditions and securing the health of individualities and communities worldwide.

**Keywords:** Vaccine; Disease; Immunization; Outbreak; Prevention.

## INTRODUCTION

Vaccine hesitancy, the reluctance or refusal to vaccinate despite the availability of vaccines, poses a significant challenge to public health efforts worldwide.[1] Recent years, it has emerged as a complex and multifaceted issue influenced by various factors such as misinformation, distrust in authorities, cultural beliefs, and socioeconomic disparities. Vaccinations are considered one of the best public health measures, but there is a growing belief that they are effective and ineffective. Lack of trust in existing vaccines is considered an obstacle to the success of vaccine programs. It is believed that the lack of interest in vaccines has led to a decrease in vaccine content and an increase in antibodies against the disease and its complications. This review provides an overview of vaccine hesitancy. First, we characterise vaccine dissatisfaction and suggest reasons for the apparent lack of vaccine resistance in established countries. We will also look at the decision-making process regarding self-vaccination.

Immunization is considered one of the most important aspects of public health. Vaccination has helped reduce mortality and morbidity from many infectious diseases and is credited with eradicating polio in the United States and smallpox worldwide.[2] Vaccines are included at a high rate to reduce viral resistant disease (VRD) incidence. In addition to providing direct protection to

**Author's Affiliation:** [1]Final Year Student, [2,3]Intern, [4]Reader, [5]Tutor, Department of Public Health Dentistry, Himachal Dental College, Sundernagar 175002, Himachal Pradesh, India.

**Corresponding Author: Anamika Choudhary,** Intern, Department of Public Health Dentistry, Himachal Dental College, Sundernagar 175002, Himachal Pradesh, India.

**E-mail:** anamikachoudhary677@gmail.com

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vaccinated individuals, high-dose vaccines can protect entire communities or herds by preventing the spread of VPD, thereby reducing the risk of the problem spreading to community victims. The high average vaccination age in most developed countries indicates that immunization remains an important public health intervention.[3]

### *Understanding Vaccine Hesitancy*

Vaccine hesitancy is not a new phenomenon, but its prominence has grown with the rise of social media and the spread of misinformation. Individuals may hesitate to vaccinate due to concerns about safety, efficacy, religious beliefs, or philosophical objections. Misinformation propagated online, ranging from conspiracy theories to unfounded claims about vaccine ingredients, exacerbates these concerns and fosters distrust in vaccines and healthcare institutions.[4]

### *Consequences of Vaccine Hesitancy:*

The consequences of vaccine hesitancy are profound and far reaching. Outbreaks of vaccine preventable diseases such as measles, pertussis, and influenza have occurred in communities with low vaccination rates, leading to increased morbidity, mortality, and healthcare costs. Moreover, vaccine hesitancy undermines herd immunity, putting vulnerable populations such as infants, the elderly, and immunocompromised individuals at greater risk of infection.[5]

### *Factors Contributing to Vaccine Hesitancy*

Several factors contribute to vaccine hesitancy, including:

1. *Misinformation:* False or misleading information about vaccines spread through social media, conspiracy theories, and anti-vaccine advocacy groups.
2. *Distrust in Authorities:* Historical instances of medical exploitation and mistrust in government and healthcare institutions erode confidence in vaccination programs.
3. *Cultural and Religious Beliefs:* Cultural norms and religious beliefs may influence attitudes towards vaccination, leading to hesitancy or refusal.[10]
4. *Socioeconomic Disparities:* Limited access to healthcare services, education, and resources disproportionately affect marginalised communities, exacerbating vaccine hesitancy.
5. *Vaccine Safety Concerns:* Reports of adverse reactions or rare side effects may fuel concerns about vaccine safety, despite scientific evidence supporting their overall safety and efficacy.[6]

### *Addressing Vaccine Hesitancy*

Addressing vaccine hesitancy requires a multifaceted approach that involves healthcare professionals, policymakers, community leaders, and the media. Key strategies include:[7]

1. **Education and Communication:** Providing accurate, accessible, and culturally sensitive information about vaccines and their benefits through trusted sources such as healthcare providers, community organisations, and public health campaigns.
2. **Building Trust:** Establishing trust between healthcare providers and patients, addressing concerns transparently, and acknowledging historical injustices to rebuild confidence in vaccination programs.
3. **Legislation and Regulation:** Implementing policies to combat misinformation, regulate vaccine exemptions, and strengthen immunisation requirements for school entry and healthcare workers.[8]
4. **Community Engagement:** Engaging with communities to understand their concerns, address barriers to vaccination, and tailor interventions to meet their needs.
5. **Collaboration and Partnership:** Collaborating with stakeholders across sectors, including governments, academia, industry, and civil society, to develop and implement comprehensive vaccination strategies.[9]

## CONCLUSION

Vaccine hesitancy is a complex and multifaceted issue that requires a concerted effort to address. By understanding the factors contributing to hesitancy, addressing misinformation, building trust, and implementing targeted interventions, we can promote vaccine acceptance and protect public health. It is imperative that we work together to ensure that vaccines remain one of the most effective tools in preventing infectious diseases and safeguarding the health of individuals and communities worldwide.

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**Review Article**

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# Fungal Infections in Humans: An Emerging Threat

**Raghupathi Challagurugula[1], Sanjay Shakya[2], Anil Patyal[3], Subash Kumar Verma[4]**

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**Abstract**

Fungal pathogens and infections are an increasing global public health concern. People most at risk are those with underlying health problems or a weakened immune system, such as chronic lung disease, prior tuberculosis (TB), HIV, cancer, and diabetes mellitus. According to researchers over 5.7 crore Indians are affected by serious fungal conditions; around 4.1% of the Indian population is probably affected, which is similar to reports from other countries like China, Brazil, Korea, Senegal, and Germany. Over 300 million people worldwide suffer from major fungal illnesses, which cause 1.6 million deaths yearly. The World Health Organisation Fungal Priority Pathogen List (FPPL) intends to concentrate and direct additional research and policy measures to boost the international response to fungal infections and antifungal resistance.

**Keywords:** Fungi; WHO; FPPL; Fungal resistance.

## INTRODUCTION

Millions of people around the world are known to be affected by fungi related disorders and have significant impact on health. However, the epidemiology of fungal infections varies between geographical areas and is influenced by a number of variables, such as at-risk persons, socioeconomic features, and fungal endemicity associated to geo-ecological parameters. When utilized as food (e.g., mushrooms, yeast, etc.) and medications (e.g. penicillin), fungi can be safe and even beneficial. Nevertheless, because of their opportunistic nature, fungi can also cause infections, which can range in severity from unfavourable (yeast infection, ringworm/athlete's foot, etc.) to fatal (Aspergillosis, Mucormycosis, Histoplasmosis, etc.) infections. Over 300 million people worldwide suffer from major fungal illnesses, which cause 1.6 million deaths yearly,[1] making fungi pathogens one of the most significant dangers to global health. Unbelievably, fungi kill four times as many people as malaria and kill as many people as tuberculosis each year.[2] However, they are still a neglected topic by public health authorities for instance, invasive mycoses weren't widely recognized as medically significant infections until the 1980s.[3] The serious fungal infections in humans are associated with

**Author's Affiliation:** [1]Ph.D. Scholar, [2]Professor and Head, [4]Assistant Professor, Department of Veterinary Public Health and Epidemiology, College of Veterinary Science & Animal Husbandry, Anjora, Durg 491001, Chhattisgarh, [3]Associate Professor, Department of Veterinary Public Health and Epidemiology, College of Veterinary & Animal Sciences, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut 250110, Uttar Pradesh, India.

**Corresponding Author: Anil Patyal,** Associate Professor, Department of Veterinary Public Health and Epidemiology, College of Veterinary & Animal Sciences, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut 250110, Uttar Pradesh, India.

**E-mail:** anilvet01@gmail.com

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conditions such as corticosteroid therapy, organ transplantation, cancer, AIDS, asthma.[1]

## FUNGAL PRIORITY PATHOGENS

In response to the rise in antimicrobial resistance, WHO created its first list of priority bacterial infections in 2017.[4] This list served as a catalyst for increased global action, including the investigation and creation of novel therapies. WHO has now created the first list of fungal priority pathogens[4], which was influenced by the BPPL (Bacterial Priority Pathogen List). The World Health Organisation Fungal Priority Pathogen List (WHO FPPL) is the first global initiative to systematically prioritize fungal diseases, taking into accounts their unmet research and development requirements and perceived importance for public health. The WHO FPPL intends to concentrate and direct additional research and policy measures to boost the international response to fungal infections and antifungal resistance. The list was created using a multi-criteria decision analysis (MCDA) methodology. The prioritization process focused on fungal pathogens that can cause invasive acute and sub acute systemic fungal infections for which drug resistance or other treatment and management challenges exist. The pathogens included were ranked, then categorized into three priority groups like critical, high, and medium (Table 1).

**Table 1:** List of Fungal Priority Pathogens Categorized by WHO[4]

| Critical group | High group | Medium group |
|---|---|---|
| Cryptococcus neoformans | Nakaseomyces glabrata | Scedosporium spp |
| Candida auris | Histoplasma spp | Lomentospora prolificans |
| Aspergillus fumigatus | Eumycetoma causative agents | Coccidioides spp |
| Candida albicans | Mucorales | Pichia kudriavzeveii (Candida krusei) |
| | Fusarium spp | Cryptococcus gattii |
| | Candida tropicalis | Talaromyces marneffei |
| | Candida parapsilosis | Pneumocystis jirovecii |
| | | Paracoccidioides spp. |

## *Fungal Infection Burden in India*

India is the second most populous country in the world and the seventh-largest country by land area. This tropical country has unique and diverse geographical characteristics, with mountains, plains, plateaus, and numerous rivers, in addition to being surrounded on three sides by vast stretches of ocean. Many fungal infections are endemic in India. Recently experimenters from All India Institute of Medical Sciences (AIIMS), New Delhi, AIIMS Kalyani, West Bengal, and Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh, along with The University of Manchester, UK, estimate over 5.7 crore Indians are affected by serious fungal conditions. Around 4.1% of the Indian population is probably affected, which is similar to reports from other countries like China, Brazil, Korea, Senegal, and Germany.[5] This total burden of serious fungal infections is >10 times the annual incidence of tuberculosis in India, indicating an enormous population of patients affected by fungal diseases.[6] The various type of serious fungal infections are summarized in following cases (Table 2).

**Table 2:** Different Fungal Infections with number of cases in India[6]

| Infection | Total no. of Cases | Rate / 100000 Population |
|---|---|---|
| RVCC | 24370566 | 1749 |
| IA | 250935 | 18 |
| CPA | 1738913 | 125 |
| SAFS | 1363142 | 97.8 |
| ABPA | 1197913 | 86.0 |
| Fungal rhinosinusitis | 1518005 | 109 |
| Mucormycosis | 195076 | 14.0 |
| Candidemia | 188035 | 13.5 |
| Candida peritonitis ICU + Surgery | 18803 | 1.35 |
| Candida peritonitis CAPD | 85 | 0.004 |
| Esophageal candidiasis | 266612 | 19.1 |
| Cryptococcal meningitis | 11526 | 0.83 |
| Pneumocystis pneumonia | 58378 | 4.19 |
| Talaromycosis | 2825 | 0.2 |
| Fungal keratitis | 1017182 | 73.0 |
| Tinea capitis | 25053332 | 1798 |
| Total Serious Fungal Infection | 57251328 | 4109 |

**RVCC** (*Recurrent vulvovaginal candidiasis*), **IA** (*Invasive aspergillosis*), **CPA** (*Chronic pulmonary aspergillosis*), **ABPA** (*Allergic bronchopulmonary aspergillosis*), **SAFS** (*Severe asthma with fungal sensitization)*, **CAPD** *(chronic ambulatory pulmonary dialysis)*

### *Factors Contribute to the Rise in the Burden of Fungal Infections*

Some of the factors that contribute to the rise in the burden of fungal infections are well understood. Major contributors are, shape shifting in a warming world, antifungal resistance, lack of knowledge resources, and lack of coordination.[7]

#### 1) Shape shifting in a Warming World

There are some fungi that have lived peacefully with humans as part of their microbiome but are now becoming invasive. One such is the *Candida* species, which lives on moist surfaces like the mucosa of the gut, mouth, vagina, and skin in humans and causes superficial dermatophyte infection.[8] Climate change directly impacts the ability of fungi to cause damage to the human host. Recently, the multi-resistant pathogen *Candida auris* has emerged as a serious global threat to human health, causing infections resistant to all major classes of antifungal drugs in immuno-compromised patients.[9] *Candida auris* differs from most other Candida species in several aspects. it is hypothesized to have a nonhuman environmental reservoir with possible dispersal by birds. This yeast is considered as the first "novel" pathogen to have evolved in response to climate change[10], although this remains speculative and awaits conclusive substantiation. The indispensable suppositions for its emergence include expanded farming and aquaculture which increased the contact with humans, and contaminate the environment with fungicides. *Candida auris* is particularly problematic in healthcare settings where it colonizes and spreads to cause nosocomial outbreaks, and it is remarkably resistant to antifungals and disinfectants.

#### 2) Antifungal Resistance

The fungicide overuse in agriculture, overuse and over prescription of antifungals in healthcare, and failure of patients to finish the entire course of antifungal treatments led to the development of resistance in fungi. Fungal genomes are relatively small compared to animals and plants and, hence, can acquire mutations easily. However, when it comes to drug discovery, it is important to understand that very few antifungals actually can be used as therapeutics. This is because fungi are eukaryotes, and many of the cellular targets overlap with the cellular machinery of their hosts. Notably, this is in contrast to the unique cellular targets presented by bacteria. To further complicate this issue, fungicides are regularly overused in agriculture to treat crops and livestock. As humans and animals end up consuming antifungals as medicines, they might also inhale/ingest fungal spores from the environment, thus disrupting the microbiome by tampering with the equilibrium and potentially prompting the evolution of resistance. Further, the tendency to not finish the antifungal course and improper disposal of drugs are also key drivers of resistance. Inadequate dosing may facilitate selective pressure that drives the evolution of the very fungi being targeted for treatment.[11]

#### 3) Lack of Knowledge and Resources

Lack of knowledge among health care professionals and diagnostic tools also appears to be contributing to the load of invasive fungal infections. At nearly 40% of *candida auris* is very high and there is little awareness among clinicians about it.[12] Some of fungal diseases resemble bacterial infections, mostly seen with *Mycobacterium tuberculosis* and *Aspergillus* spp. *Aspergillus* infection is misdiagnosed as TB, those who have recovered from TB are susceptible to *Aspergillus* because of scars in the lungs.[13] The availability of mycology laboratories in India is abysmal. Every state needs at least one for fungal disease. Currently, there are only 9 such laboratories in India. The first one was established in the PGIMER, Chandigarh in 1996 with the support of the Indian Council of Medical Research. This is also the WHO collaborating centre.[8]

#### 4) Lack of Coordination

A specific assessment of the prevalence and incidence of each fungal infection worldwide is unclear due to a lack of cooperation between national and international institutions, and statistics are scarce in the majority of nations, particularly in the developing world.[14] In comparison to financing for other infectious diseases that generate comparable mortality, research funding for fungi infections is certainly modest. For instance, research on the fifth deadliest infectious disease, cryptococcal meningitis, receives 4.3 times less funding than the illness brought on by the bacterial infection Neisseria meningitis.[15] Knowledge generation is directly impacted by decreased funding for fungal disease research and innovation. For instance, 8,827 and 5,687 scientific articles, focused and published on tuberculosis and malaria in 2017, respectively. Fungal diseases, on the other hand, were much less investigated, with 213 papers on cryptococcosis, 80 on Para coccidioidomycosis,

51 on chromoblastomycosis, 53 on mycetoma, and 56 on sporotrichosis produced in the same period.[15] These figures are presumably linked to intimidating data, similar as the forenamed lack of vaccines able to prevent fungal disease, less effective diagnostics, and a dearth of anti-fungal medicines in development.

### *Challenges to Antifungal Drug Development*

Increased antifungal resistance leads to the reduced efficacy of fungal disease treatments. At the patient level, treatment failure may translate to prolonged infection or even death. As a result, scientists are actively searching for new drug candidates, but several factors challenge antifungal drug development in ways that are unique from other antimicrobials. The major problem lies with the similarity in human and fungal genomes, for example, it is suggested that common brewer's yeast (*Saccharomyces cerevisiae*) has about 30% human like proteins, making it one of the most similar lower eukaryotes to humans.[16] This means that some drugs and drug doses can be harmful to humans due to similar enzymes and metabolic pathways. It can be difficult to identify fungal species through conventional laboratory methods. For example, *Candida auris* is often misidentified as other Candida species, which make infections onerous to treat and/or result in faulty treatment. Several fungi exist as part of the normal microbiota and act as opportunistic pathogens, primarily in immuno-compromised patients. That means that most of the time, the fungi won't be problematic, and developing treatments for the unique conditions in which they do cause infection requires additional consideration.[11]

### *Strategies to Control Fungal Infections in Human Beings*

A growing hazard to public health comes from resistant fungus. Everyone has a part in contributing in preventing resistant fungal diseases, including researchers, medical professionals, and the general public.[17]

Prevention increases your ability to stop and treat infections that are resistant to antifungals and healthcare associated infections. By collaborating with the public, business, and medical professionals, you may encourage responsible usage of antifungals may be encouraged. One health surveillance system expands testing and monitoring capabilities for antifungal resistance and discovers trends and patterns in healthcare and agricultural settings by cooperating with federal and state agencies. The awareness of the numerous variables that lead to the emergence, transmission, and ongoing existence of infections that are resistant to antifungals need improvement. The advanced diagnostic and laboratory facilities to diagnose antifungal resistant infections and to enhance surveillance, infection control, and treatment choices, novel laboratory tests and clinical diagnostics should be created and validated. Collaboration between nations working with global partners to identify, stop, and manage fungi that are resistant to antifungals anywhere in the world should be strengthened.[17]

### *Recent Initiatives for Control of Fungal Infections*

To raise awareness of the value of antifungal stewardship, reducing antifungal drug resistance, and identifying serious fungal diseases early enough in the course of a patient's illness to provide lifesaving treatment, the CDC and partners created fungal awareness week, which is observed in early October.[17] The UK government released its plan in January 2019 for AMR to be contained and under control by 2040. The vision acknowledges that an issue as large and complex as AMR requires a long-term strategy that steadily improves our comprehension of AMR and what controls it. The Department is funding basic and applied research in India's Infectious Disease Biology-1 (Bacterial and Fungal Diseases) course to better understand and eventually offer solutions for therapeutics, diagnostics, and preventive measures for infectious diseases caused by bacterial and fungal pathogens, including areas of global concern like Tuberculosis (including MDR and XDR TB) and AMR (Anti-Microbial Resistance).

## CONCLUSION

Fungal infections frequently go undetected. They are among the most challenging disorders to treat, even after being discovered. They are now stealthily expanding around the world, preying on people's weakening immune systems and exploiting the high prevalence of diabetes. The necessity for public health initiatives to lower the frequency and mortality of various infectious diseases is highlighted by the understanding that fungi infections play a significant role in the mortality of a number of ailments. Focusing on enhancing diagnostics is a clinical requirement just as crucial as developing novel antifungal

medications because a late diagnosis is associated with a poor outcome. Additionally, it is vitally necessary to create diagnostic tests that are affordable and transportable to low-income nations in field hospital settings.

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[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540-7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347-55.

**Article in supplement or special issue**

[3] Fleischer W, Reimer K. Povidone iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3-9.

**Corporate (collective) author**

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792-801.

**Unpublished article**

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

**Personal author(s)**

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

**Chapter in book**

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O,

Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. p. 7-27.

**No author given**

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

**Reference from electronic media**

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979-2001. www.statistics.gov.uk/downloads/theme_health/HSQ20.pdf (accessed Jan 24, 2005): 7-18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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