Journal of Pharmaceutical Research International

33(64A): 471-479, 2021; Article no.JPRI.81856
ISSN: 2456-9119
(Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759)

Demographic Profiling of Patients with Leukoplakia Visiting a Dental Hospital in Chennai, India - An Institutional Study

Saishree Anchana Rajeswaran [a] and Pratibha Ramani [b*]

[a] Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-77, India.
[b] Department of Oral Pathology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-77, India.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i64A35794

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/81856

Original Research Article

Received 23 October 2021
Accepted 27 December 2021
Published 30 December 2021

ABSTRACT

Introduction: Oral potentially malignant disorders (OPMDs) are a group of conditions that predispose to the development of oral cancers. A few of the commonly recurring OPMDs include leukoplakia, oral submucous fibrosis, Smokers' palate, and oral lichen planus. Leukoplakia is more common in specific populations, attributed to their habits and environmental circumstances. Hence, early diagnosis with biopsies on suspecting these lesions during regular oral health check-up ensures timely referral and addressal of the disorder. The present study aims to demographically profile patients with Leukoplakia visiting a private dental hospital in Chennai.
Aim: To demographically profile patients diagnosed with Leukoplakia, visiting a dental hospital in Chennai, a major city in the state of Tamil Nadu, India.
Materials and Methods: From the patients visiting the private dental hospital, those clinically diagnosed with Leukoplakia were considered in the inclusion criteria. Exclusion criteria involved those with poor maintenance of records and lack of follow-up of uncooperative patients. The sample size was n=100. The gender, age and locality of residence were considered and tabulated, followed by their statistical analysis using SPSS software version 22.0.

**Corresponding author: E-mail: pratibaramani@saveetha.com;*

Results: From the results of the current study, it was observed that there was a greater male predilection to the occurrence of Leukoplakia (99%) compared to females (1%). A greater number of cases were seen in the age group of 41-50 years (34%), while the least number of cases were seen in patients of 21-30 years (7%). Among the cases reported, most patients were from Thiruvallur (40%), Chennai district (30%) followed by Kancheepuram district (17%) in Tamilnadu .
Conclusion: From the study, it can be concluded that Leukoplakia is more prevalent among the middle aged male population and was found to be predominantly occurring in the regions of Thiruvallur and Chennai districts in Chennai, Tamil Nadu.

Keywords: Leukoplakia; demographic profiling; dental hospital; oral potentially malignant disorders; novel analysis; innovative method.

1. INTRODUCTION

Oral potentially malignant disorders (OPMDs) are a group of conditions that predispose to the development of oral cancers. The World Health Organization (WHO) earlier termed these as precancerous lesions [1]. which were later accepted to be potentially malignant given the fact that they may or may not proceed into malignant forms [2]. A few of the commonly recurring OPMDs include leukoplakia, oral submucous fibrosis, Smokers' palate, oral lichen planus, lichenoid reactions in the oral mucosa, graft-versus-host disease, lupus erythematosus, dyskeratosis congenita, epidermolysis bullosa and actinic cheilitis [3]. These disorders are further clinically typed to aid in predicting the condition's prognosis. Further, early diagnosis with biopsies on suspecting these lesions during regular oral health check-up ensures timely referral and addressal of the disorder [4]. This is of prime concern as most of these conditions are asymptomatic on onset, and cannot be identified unless suspected by professional intervention. Besides, particular OPMDs are more common in specific populations, attributed to their habits and environmental circumstances, for example, certain studies show a greater prevalence of Oral submucous fibrosis in Asian populations [3]. The progressive transformation of these disorders are implacable as they often end up in malignancy [5]. This feature gave these types of disorders, the previous name 'precancerous lesions'. However, with advancements in the medical field, it has been proved repeatedly that certain morbidities indicate a pattern in their occurrence and can be traced in the population [6]. This supports both diagnosis and treatment, allowing the progression of these disorders to be cessated, provided they are identified early. Hence, they have the potential to turn malignant without timely intervention. Thus, the WHO Collaborating Center adopted the latter term recently [7].

A very common OPMD is oral leukoplakia defined as a white mucosal lesion that cannot be characterized pathologically or clinically as any other lesion [8]. It is closely related to the habit of smoking or exposure to tobacco [9]. Some synergistic risk factors include consuming alcohol, acquiring bacterial and fungal infections, chronic irritation of the oral mucosa due to sharp teeth or ill-fitted dentures or due to syphilis, a sexually transmitted disease [10]. Sometimes even exposure to ultraviolet rays and oral galvanism caused by old metallic restorations may also lead to its development [11].

The histological presentation of oral leukoplakia begins with hyperkeratosis and progresses into the different stages of dysplasia, i.e. mild, moderate and severe dysplasia, finally ending in carcinoma in-situ [12]. Typical histological changes include hyperkeratosis and acanthosis, parakeratinization, followed by widening and elongation of rete pegs, increase in the mitotic figures, and formation of keratin pearls. The final stage of carcinoma in-situ is reached where there is no breach in the basement membrane or invasion into the connective tissue [13]. Cytological changes including pleomorphic nuclei, increased nuclear-cytoplasmic ratio, reversal of basal cell polarity, prominent nucleoli and hyperchromasia are observed [14]. Further, based on their clinical presentation, they can be classified as verrucous, speckled, granular or homogenous leukoplakia [15]. Biopsy from the site of the oral mucosal lesion is the standard diagnostic procedure [16]. It requires a trained health professional to do the biopsy, as it is an invasive procedure. Large lesions require an incisional biopsy while smaller lesions require excisional biopsy [17]. The treatment for leukoplakia involves surgical excision of the lesion or laser mediated surgery if the dysplasia is identified between moderate and severe [18].

The need for documenting these incidences at a hospital level lies in not only enhancing awareness of the same, but also for eliciting their patterns of occurrence, identifying more prone populations, predisposing behaviors, and recognising their prevalence in various socio-economic situations [19].These documentations further would aid the evidence based segmentation analysis of patients, in the context of culture, health needs and health status of the entire population involved. Thereby, identifying that group of the population predisposed to developing Leukoplakia can be identified and the progression of these conditions into malignant forms can be curbed with timely prophylactic management. Our team has extensive knowledge and research experience that has translated into high quality publications in the same field [20-31]. Thus, the present study aims to assess the demographic details of patients clinically diagnosed with Leukoplakia.

2. MATERIALS AND METHODS

The present study was a retrospective study, performed under a University setting, among patients who reported to a Private Dental College and Hospital in Chennai, Tamil Nadu, India. The data was collected from a total of 5,35,941 patients who reported to the dental college from June 2019 to February 2021. The ethical approval was obtained from the Institutional Ethical Comittee (ethical approval number:SDC/SIHEC/2020/DIASDATA/0619-0320). The population size was n=100, based on visual diagnosis of leukoplakia, and complete record maintenance. The data was cross verified using photographic record and was compiled under the categories of age, gender, and locality of residence. A descriptive statistical analysis was performed using the SPSS software (version 22.0). Any sampling bias was minimised with data collected from within the University and by using simple random sampling methods. This ensured a high internal validity, with, however, a low external validity. Any improper, incomplete or repeated data was ruled out. Pearson's Chi Square test was used to compare the groups where $p<0.05$ was considered significant, and the results were interpreted.

3. RESULTS

In the present study, the total number of patients with leukoplakia was n=100, out of which 7% belonged to 20-30 years, 20% in 31-40 years, 34% in 41-50 years, 29% in 51-60 years and 10% in 61-70 years (Table 1). Among these, most patients belonged to the Thiruvallur district (40%) followed by the Chennai district (30%), Kancheepuram district (17%), Chengalpattu (4%), Vellore (3%), Dharmapuri (2%), and 1% each in Sivagangai, Kallakurichi, Pudukottai and Tiruvannamalai districts (Table 2). Gender distribution of the patients with leukoplakia showed 99% of the patients were males while 1% of the population was female (Table 3). Association between age groups and locality of residence (Fig. 1) showed patients predominantly belonged to the Thiruvallur district from all age groups, including 20-30 years (4%), 31-40 years (8%), 41-50 years (10%), 51-60 years (14%), 61-70 years (4%), with $p=0.840$ ($p>0.05$) indicating no significant association between them. Association between gender and locality of residence (Fig. 2) showed that male patients predominantly belonged to Thiruvallur district (40%), and females to Kancheepuram district (1%), with $p=0.854$ ($p>0.05$) indicating no significant association between them.

4. DISCUSSION

The requirement of profiling cases categorically based on the areas patients hail from is essential in identifying patterns of occurrence of the concerned health conditions. Besides, the polymorphisms in the gene pool of a population or a locality may also be traced based on similar diseases seen in them [20]. Moreover, demographic profiling enables us to elicit and associate risk factors to the malignant transformation of the oral mucosa. It also enables us to prophylactically manage and halt the progression of leukoplakia into cancers, when predisposed individuals approach the practitioner [32]. Thus, the informed practitioner will be able to identify mucosal abnormalities in the oral cavity aptly, and provide timely intervention and assistance [33]. Previous studies [34,35] have indicated a greater occurrence of leukoplakia in the South-Asian population, providing evidence to practitioners on what can be expected in patients hailing from these demographic regions. Further, other studies [36] have also illustrated the necessity of profiling patients on a socio-economic scale, relating their economic background and their associated habits, to their exposure to risk factors, and thus accounting the same to be causative of leukoplakias [37].

Table 1. The table represents the frequency distribution of age groups of patients visiting a private dental college and hospital in Chennai, diagnosed with Leukoplakia. Which was more prevalent in the age group of 41-50 years (34%)

Frequency Distribution of age groups				
Valid	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
20-30	7	7.0	7.0	7.0
31-40	20	20.0	20.0	27.0
41-50	34	34.0	34.0	61.0
51-60	29	29.0	29.0	90.0
61-70	10	10.0	10.0	100.0
Total	100	100.0	100.0	

Table 2. The table represents the frequency distribution of the locality of residence of patients diagnosed with leukoplakia, visiting a dental college and hospital in Chennai, which was more prevalent in patients from the Thiruvallur district (40%)

Frequency Distribution of Place				
Valid	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Chennai	30	30.0	30.0	30.0
Sivagangai	1	1.0	1.0	31.0
Tiruvallur	40	40.0	40.0	71.0
Kancheepuram	17	17.0	17.0	88.0
Chengalpattu	4	4.0	4.0	92.0
Vellore	3	3.0	3.0	95.0
Pudhukottai	1	1.0	1.0	96.2
Dharmapuri	2	2.0	2.0	98.0
Kallakurichi	1	1.0	1.0	99.0
Tiruvannamalai	1	1.0	1.0	100.0
Total	100	100.0	100.0	

Table 3. The table represents the gender distribution of patients diagnosed with leukoplakia, included in the study, which showed more prevalence among males (99%) than females

Gender Distribution				
Valid	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Male	99	99.0	99.0	99.0
Female	1	1.0	1.0	100.0
Total	100	100.0	100.0	

In the present retrospective study, of the 100 patients assessed, area wise profiling of patients was done to identify which areas in the neighborhood of the city, can be plausible hotspots for the occurrence of leukoplakia. In the current study, patients were categorized into 5 age groups (Table 1) in the present study. More cases of leukoplakia were seen in the age group of 41-50 years (34%), while the least number of cases were seen in patients of 21-30 years (7%). This finding is concordant with a previous study by It has been recorded earlier by Pires et al. [38] that a higher number of patients belonging to the middle ages were affected with leukoplakia due to the long duration of constant exposure to the mucosal irritants that are causative of malignant transformation of the oral mucosa. However this is discrepant with another study by Balsaraf et al. [39] who discussed the current trends of increased use of tobacco in the adolescent ages itself, to be causative of leukoplakia by the age of 30.

Further, from the results of the present study (Table 2) it was observed that there was a male predilection to the occurrence of leukoplakia (99%) compared to females (1%). This was concordant with a previous study by Mello FW et al. [40] who indicated a male preponderance (95%) to the occurrence of leukoplakia, probably attributed to the increased risk factors that males are prone to, a major one being the use of

tobacco [41]. Other similar studies [42] also indicated a similar pattern in its occurrence among male patients, coherent with the results in the current study.

Considering that the study was conducted in the city of Chennai, the patients who reported here were from districts within the city, while few were from distant places (Table 3). Patients hailed from the districts of Chennai, Chengalpattu. Dharmapuri, Kancheepuram, Thiruvallur, Thiruvannamalai, Pudukottai, Sivagangai and Vellore. Among these, most of the patients were from the districts of Thiruvallur (40%), Chennai (30%) and Kancheepuram (17%) only, indicating that these regions may be leukoplakia hotspots. However, one cannot overlook the possibility of a bias due to patients visiting the hospital as it's their nearest and most accessible center of medical care.

Our study shows that among all the age groups, more patients were from the Thiruvallur district over the other localities (Fig. 1). Possible causes of this high prevalence may be the increased use of tobacco and consumption of alcohol with reduced awareness of the implications of the same, given that Thiruvallur is populated with middle and lower income category people [43]. Besides, this bias could also be due to the ease

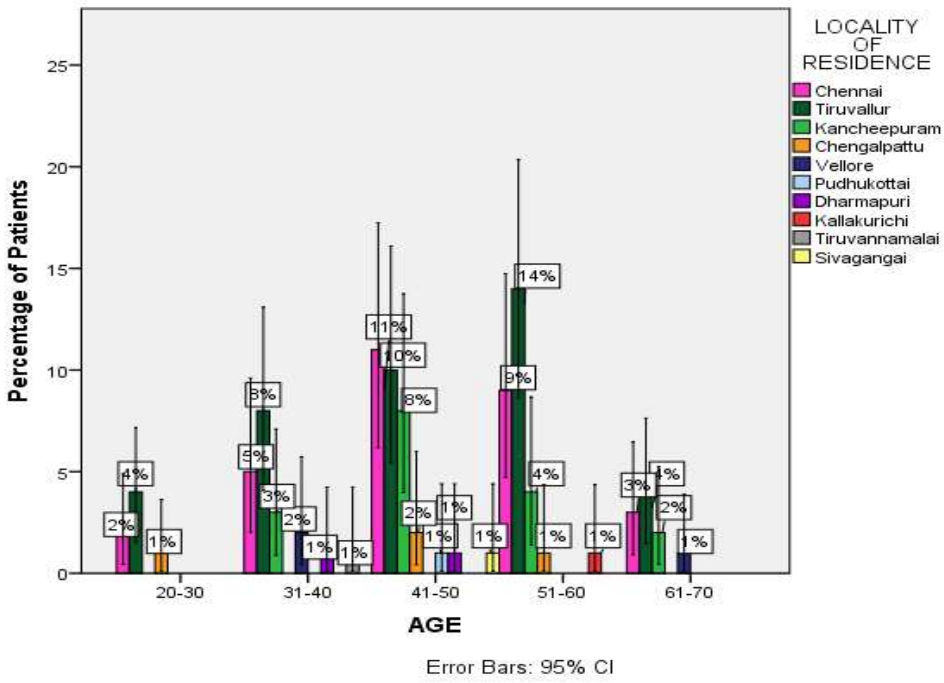

Fig. 1. The graph represents the correlation between age groups and area-wise distribution of the patients with leukoplakia. The X-axis is representative of age groups while the Y-axis is representative of the percentage of patients with leukoplakia belonging to different localities within Tamil Nadu. Pink represents Chennai district, yellow represents Sivagangai district, dark green represents Thiruvallur district, light green represents Kancheepuram, orange represents Chengalpattu, dark blue represents Vellore, light blue represents Pudukottai, purple represents Dharmapuri, red represents Kallakuruchi and grey represents Thiruvannamalai. According to the graph, from the age group of 41-50 years in which leukoplakia was more prevalent, patients predominantly belonged to the Chennai district (11%). From 51-60 years, more patients were from Thiruvallur district (14%), from 31-40 years 8% patients were from Thiruvallur district. From 20-30 years and 61-70 years each, 4% patients were from the Thiruvallur district. Pearson's chi-square test showed p=0.840; indicating that results were statistically not significant (p>0.05), It can thus be inferred that from the age group of 41-50 years in which leukoplakia was more prevalent, patients mostly belonged to the Chennai district (11%). However, in all other age groups, Thiruvallur district was more predominant

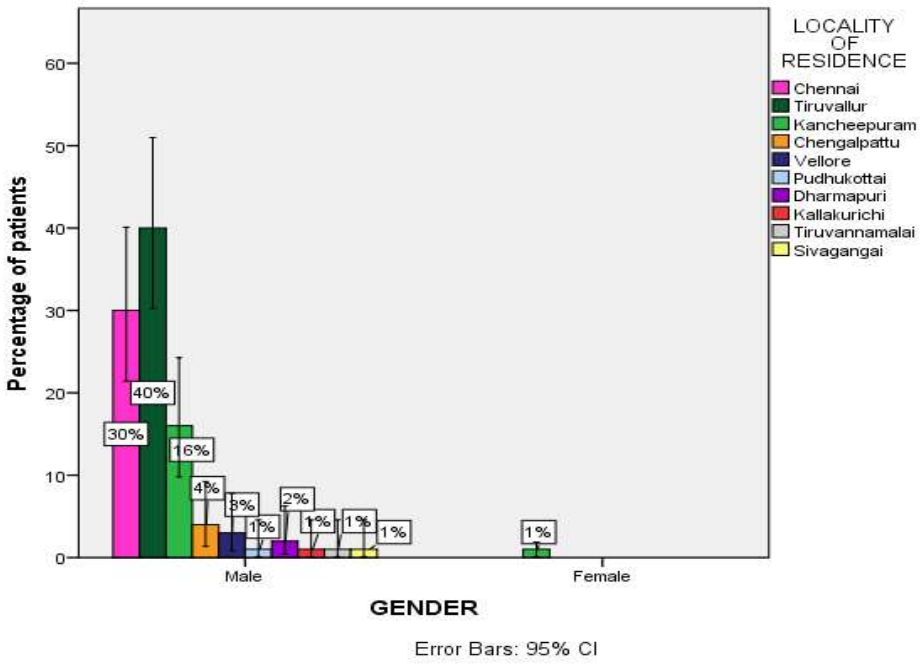

Fig. 2. The graph represents the correlation between the gender of patients diagnosed with leukoplakia and their locality of residence. The X-axis is representative of gender while the Y-axis is representative of the area-wise percentage of patients with leukoplakia with a scale of 0-40. According to the graph, pink represents Chennai district, yellow represents Sivagangai district, dark green represents Thiruvallur district, light green represents Kancheepuram, orange represents Chengalpattu, dark blue represents Vellore, light blue represents Pudukottai, purple represents Dharmapuri, red represents Kallakuruchi and grey represents Thiruvannamalai. It is evident from the graph that 40% of the male patients predominantly belonged to Thiruvallur district, while the female patient (1%) was from Kancheepuram district. Pearson's chi-square test gave p=0.854; indicating that results were statistically not significant (p>0.05), yet it can be inferred that predominantly, male patients were from the Thiruvallur district (40%)

of access to people living in nearby localities to this dental hospital. Pearson's chi-square value was p=0.840; it was statistically not significant (p>0.05). The study also highlighted the correlation between gender and locality of residence of patients with leukoplakia. Pearson's chi-square test for this finding showed p=0.854; which was statistically not significant (p>0.05) (Fig. 2). The insignificant p-values could be attributed to the small sample size or due to the location related bias of the patients turning up in the hospital on account of proximity. However, demographic profiling provides data indicative of what the practitioner may be able to find or expect in patients, who give details of living in the same localities that provide evidence of being leukoplakia hotspots.

Thus, the present study, with its limitations of the small sample size, and restricted demographic area taken in consideration, has attempted to categorize and demographically profile patients to provide evidence on what practitioners may find on examining the oral cavity of patients hailing from particular localities.

5. CONCLUSION

From the study, it can be concluded that leukoplakia in the localities considered under the study, the middle aged male gender is affected more than the female population. Given that Thiruvallur, followed by Chennai district, and Kancheepuram were the most affected districts, it correlates with the predominance of the disease among the lower and middle income populations. This could be due to their lack of awareness on the implications of the use of tobacco and tobacco products. Hence it is necessary to educate such patients as both a

preventive and therapeutic means to reduce the disease distribution. Holding awareness drives and screening high risk patients can be an effective initiative from the dental health sectors. Adolescent children must be made aware of the negative impacts of being drawn to these harmful habits as it would prevent them from facing tobacco related health issues in the future. However, the study is done within the limits of the small sample size and bias of locality of residence of the patient which may be close to the hospital's location. Hence, to expand on the study, it is necessary to encompass a larger population, so as to avoid any bias related to the ease of approach of the patient to the hospital considered here, due to the patient's proximity to the locality.

ETHICAL APPROVAL

The ethical approval was obtained from the Institutional Ethical Comittee (ethical approval number:SDC/SIHEC/2020/DIASDATA/0619-0320).

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
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