PREVALENCE OF PERIODONTITIS BASED ON ETHNIC DISPARITY IN KARACHI, PAKISTAN

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ABSTRACT

The aim of the study was to describe prevalence of periodontitis and associated risk factors among different ethnic groups residing in Karachi who have visited dental OPD.

METHEODOLOGY:

It was a cross sectional study that included data from dental health in the southern Karachi. Sample size was N=82, 30-75 year age. Data on Ethnicity, education, par functional habits (betel quid, betel nut, gutkwa/mawa, and weed), clinical attachment loss, probing depth, radiographic bone loss and tooth brushing habits were collected by a questionnaire. This transverse study with 41 healthy individuals and 41 periodontitis suffering cases belonging to different ethnic groups dwelling in Karachi were recruited to assess severity of periodontitis among there socio-culturally different ethic pools. Periodontal conditions were assessed by clinical examination. A modified version of the new AAP/EFP (American Academy of Periodontology (AAP) / European Federation of Periodontology (EFP) classification system of periodontal disease was

used to estimate the severity of periodontitis. Three stages were used: 'Non-severe periodontitis', 'Stage II', and stage 'III/IV' and via GCF that was assessed using ELISA.

RESULTS:

Urdu Speaking and ethnic groups clustered under the category of "Others" showed a majority when periodontal prevalence is considered. Both the novel markers of MMP-8 and IL-1β, showed different patterns among several ethic groups. Furthermore, this study mentioned the need to conduct more detailed studies with large sample size to determine the factors associated to this finding.

CONCLUSION:

Influence of periodontitis on different ethnic group is significantly attributed to the Para functional habits, their life style and socio - economic status prevailing in an ethnic group in abundance that is required to be studied in future studies.

INTRODUCTION:

Pakistan is one of the major Asian country comprising **22 crores that** is equivalent to **2.83%** of the total world population. And ranks number **5** in the list of countries by population in the world map. Where Karachi accommodates 16.5 million population of Pakistan (https://www.worldometers.info/pakistan) and makes it the 7th largest urban agglomeration. Whereas, the largest city in the Muslim world. https://esa.un.org/unpd/wup. These statistics shows that a data obtained from such a populous center will help in developing the generalized image of disease status in that geographic, this serves the purpose of study that data obtain from Karachi will provide an authentic baseline for future exploration to understand the patterns of periodontal diseases and their variants among variable ethno-linguistic groups dwelling in Karachi. This article also played an instrumental role concerning prevalence of periodontal problems of these ethnic groups in 2021. Periodontal problem is world known oral debilitating ailment that progresses with time, if left un-treated. The aim of this study was to assess the current prevalence of chronic periodontitis in different ethnic groups with unlike life styles using universally recognized multimarket assessment in gingival crevicular fluid

Periodontal disease is world's common NCD; as a matter of fact it owns high spectrum prevalence all over the world. This disease has been under scientific discussion since long ago but there still exist misperceptions and misinterpretation due to diversification of site, Episodic nature, degree of involvement, acute exacerbation of chronic lesion and degree of influence by oral homeostasis e.g. amount of bacterial loading, coexisting Para functional habits of individual and the life style. These factors make it difficult to identify the disease infliction at right time. Although, advancement of medical field has made many breakthroughs in the multitude of disease. This made clinician to have better pathophysiological information about disease progression, intervention its treatment and management. History, dates back that periodontitis is world second most common oral disease [1]. It stands eleventh most prevalent condition worldwide and sixth most common NCD (Chikte et al., 2019), effecting 20 %-50% human population on world map. Recent CDC report showed 47.2% of population aged above 30 years has some form of periodontitis. Process of ageing is a risk factor of periodontitis, 70.1% of adults 65 years and above have shown periodontal disease in U.S[2].

(https://www.cdc.gov/oralhealth/conditions/periodontal-disease.html).

Regional data shows that China, India, Japan, South Korea and Thailand have high prevalence of severe forms of periodontitis[3]. According to W.H.O.3 report, it was reported that 18% population of Pakistan has some form of periodontal problems and out of these 31% has periodontitis. 02-Feb-2018 (JPDA) [4].

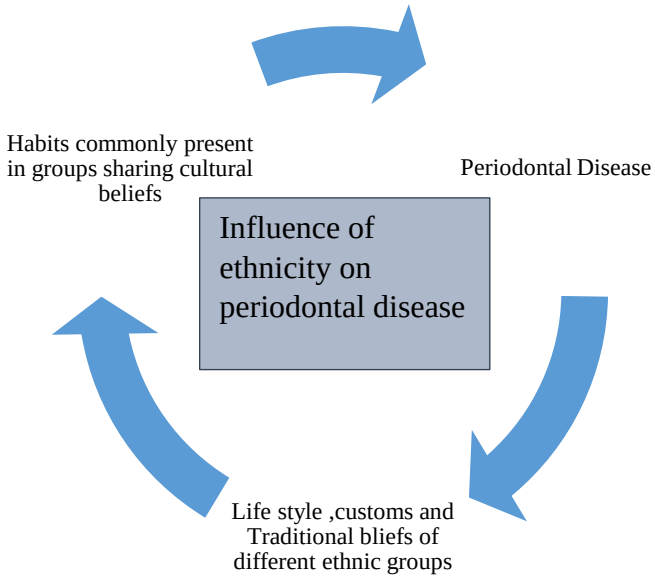
Severity of periodontal disease is based on several factors that is may be modifiable or non-modifiable. The later factor comprises mainly in age and genetic susceptibility[5], however modifiable ones include poor oral hygiene[6]Stress[7]and systemic condition like diabetes[8] and respiratory problems[9].Although most recognizable risk factor of today is tobacco use both smoked tobacco (ST) and smokeless tobacco (SLT) [10, 11].

Tobacco use regardless of its form - wet, dry, powdered, smoked, non-smoked, vaporized, are associated with a higher risk of developing severe periodontal disease[12, 13, 14] At now, It is thought that combination of several mechanisms triggers fast pathogenesis and exacerbation of periodontal disease that initiates series of events if left un-intercepted such as: (1) Decreased gingival perviousness that inhibits delivery of nutrients and oxygen molecules as well as by-products. (2) Suppression of immune response, especially inflammation (3) retards process of healing and repair (4) dysbiosis and increased

infectivity of oral micro biota. Combination of these factors or long standing of individual factors leads to impaired wound healing and upsurges pace of periodontal disease progression. Similar to other chronic infections, periodontal illness is viewed as a complex ailment and patient practices, ecological variables, medicine use, hereditary and epigenetic impacts aid in disease progression[15]. Under the influence of different habits that are transferred from generation to generation or adapted with individual's own will. The inflammatory cycle is further jeopardized and effects different organs to variable extents of severity. Multiple ethnic groups shares same rituals, common beliefs and identical habits and ways of living .These characteristics are common among same community but may differ from one ethnic group to another.

Effect of racial disparities have studied in other parts of world too such as, racial contrasts in periodontal infections in the U.S. have been perceived, with African Americans and Mexican-Americans as more susceptible to periodontal infections than other racial gatherings[16,17] where the periodontal wellbeing among white individuals is superior to other ethnic gatherings[18] . This might be because of the impact of race on income and education[19]. In this manner, acknowledgment of racial varieties is a critical side to recognize individual's oral and general wellbeing[20] Formerly conducted studies has displayed that the racial variations in oral health is connected by behavioral, custom , traditional and financial exponents. And access to dental facilities and opportunities were found to be significantly high level of dental illness and low level of oral care among expatriates [21,22,23,24].

Literature has shown association between different habits (use of betel nut, betel quid, dipping snuff, less than two time brushing /no brushing) that are found common in groups of human population that share same custom and traditional beliefs and periodontal complaints among different ethnic groups. This shows that there exist a profound cohesive relationship between the trio of (1) ethnic group (2) their habits and (3) periodontal disease prevalence.



Flow chart shows influence of ethnicity on periodontal disease

Different variants of tobacco influence the peridontium variably. Betel nut form of tobacco is most primitive and is widely available alone or in combination with other forms of areca use. It affects the mucosa by inducing lichenoid lesions[25, 26], gutka/mawa deteriorates mucosal integrity and decrease

strength of barrier against foreign invasion[27].Studies have shown that arecoline inhibits growth and protein synthesis in periodontal fibroblasts suggesting that areca nut may exacerbate preexisting periodontal disease and impair periodontal reattachment[28]. Initiation and addiction of these habits is majorly linked with profession, group pressure, self-comfort and a habit that is commonly practiced by ancestors is in advertently transferred to next generations.

In Pakistan, Karachi is known for its rich multiethnic inhabitation.as far as we know there is no study in the College of Dentistry, Bahria university medical and dental college and other dental colleges in Karachi that depicts the impact of racial differences on periodontal wellbeing, Staging and grading among the multiethnic groups using multi bio-marker technique among individuals visiting dental hospital. Therefore, the purpose of this study is to evaluate periodontal status among culturally different groups who visited dental Opd.

This study has elucidated the hierarchy of periodontal prevalence among ethnic group and has also highlighted the target population, which will make it easier to develop effective policy frame work for high risk ethnic clusters. Ethnicity, influences periodontal disease progression among different groups of population in a variety of ways. This is mainly attributed to their life style, profession, para functional eating habits and other psycho-social factors like stress and anxiety.

METHODOLOGY:

A total of 100 individuals were examined out of which 82 qualified the inclusion criteria and presented with CAL (clinical attachment loss) ≥ 4mm, PD (probing depth) ≥ 3mm, bone loss on radio graph (Bitewing - ≥ 2mm, from the CEJ to crest of alveolar bone) belonging to different ethnic groups including Urdu speaking, Sindhi speaking, Pashtoon speaking, Punjabi speaking, balouchi speaking and Gujrati / Bohri/ Memoni/ speaking were included under Memon ethnicity. Whereas, Patients were excluded on the basis of factors like presence of any co morbid conditions, habit of smokers, use of alcoholics, patient taking steroids therapy for any reason, those who had antibiotic or scaling root planning / periodontal treatment within last six months also pregnant and lactating females were all excluded from the study group.

All the individuals after qualifying inclusion criteria underwent detailed periodontal examination. Periodontal charting was obtained from the teeth that showed sign of periodontitis. Gingival crevicular fluid was attained using perio paper stirps (oraflow Inc. USA), strips were placed in the sulcus at 6 sites per tooth (mesio-buccal (MB) mid – buccal (B), disto buccal (DB), mesio lingual (ML), lingual (L), Disto lingual (DL) for 30 seconds . The sterile strips were kept in storage until before analysis. ELISA was performed in laboratory to detect periodontal disease presence among different ethnic groups. All clinical recordings were performed by a single trained examiner (SM). Michigan O probe with Williams's markings. For calibration purposes, intra-examiner reproducibility was determined by the re-examination of a randomly selected quadrant in 10 patients.

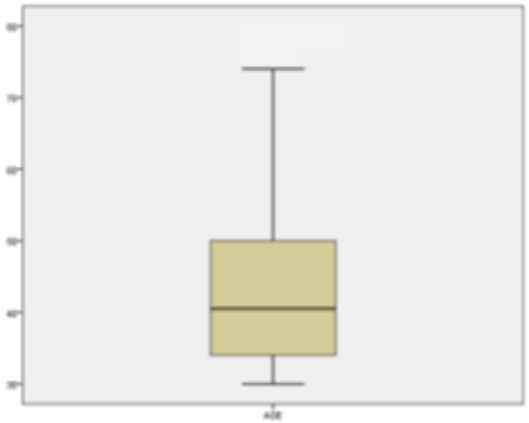
STATISTICAL ANALYSIS:

Gingival crevicular samples were collected from 84 individuals belonging to different ethnic groups were recruited in the study, GCF was collected and analyzed using enzyme linked

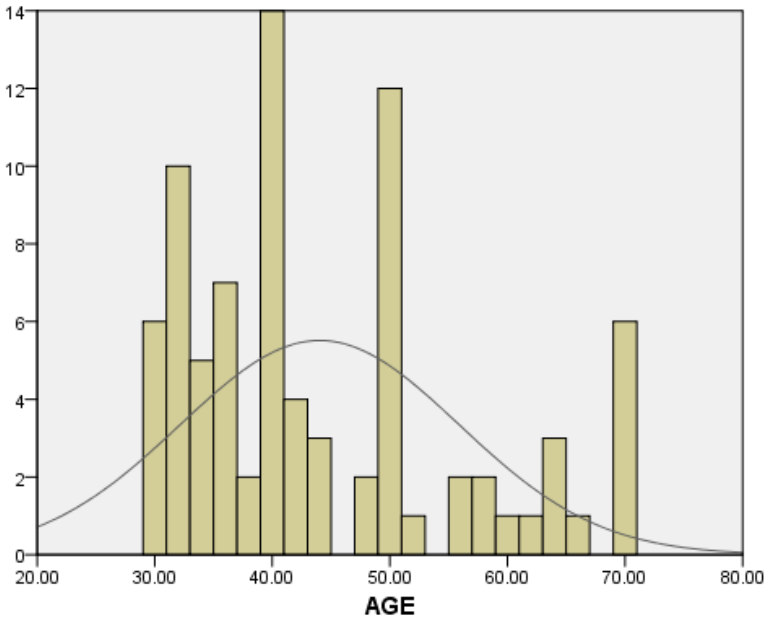
Immunosorbent assay. Descriptive statistics were used in this baseline study showing levels of MMP-8 and IL-1β in GCF specimen of different ethnic group. SPSS software version 20, IBM Corporation, Armonk, New York was used.

RESULTS:

This was a baseline study that was aimed to gather knowledge about current prevalence of periodontitis among different ethnic groups residing in Karachi and have visited to dental Opd. Many interesting factors were discovered that influenced the disease and worsen the clinical presentation among indigenous population .Showing microbial load among the 82 study participants, Data shows maximum majority individuals reporting the ailment in the age of 4^{th} and 5^{th} decade of life (from both normal and chronic periodontitis sufferers) as shown in the box plot below.



Boxplot showing prevalence of periodontitis in 4^{th} and 5^{th} decade of life



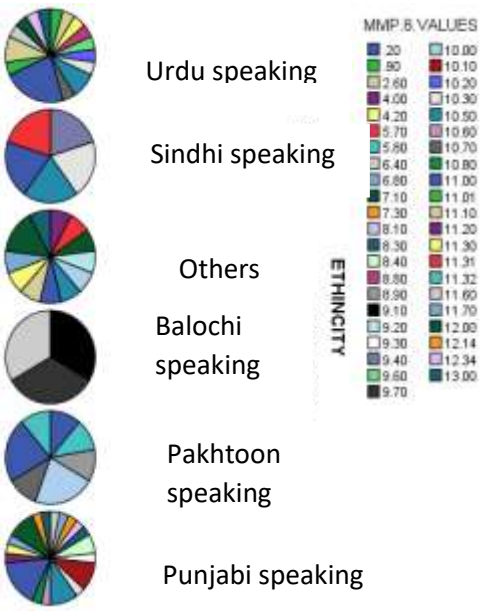
Graph showing the mean age of individuals effected by periodontitis in sample of different ethnic groups

There were 58.5 % males and 41.5 % females, out of 82 candidates. This trend was found most probably due to betel habit, which was found more common among males contributing occurrence of chronic periodontitis consequently. The mean scores for plaque, calculus, and gingival bleeding for the study population were 1.31±0.55, 1.52±0.65, and 0.80±0.23, respectively.

Considering mean values, for MMP-8 amid different ethnic groups with predominant ethnic group is Urdu speaking followed by Sindhi speaking > Others > Pakhtoon speaking > Balochi speaking and Punjabi speaking .As a matter of fact this ladder patterns is majorly attributed to betel chewing habit in different ethnic groups accompanied with poor oral hygiene, samples grouped under "Others" turned out 90% memons that showed high morbidity.

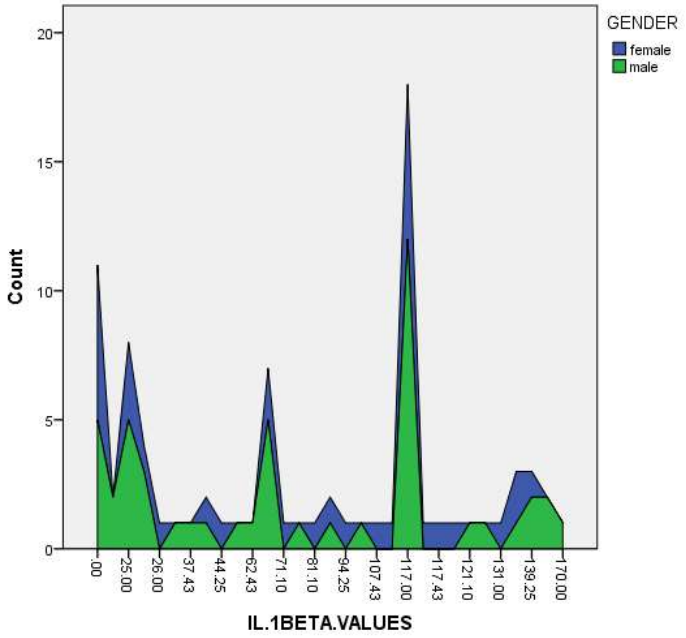
MMP-8 values / Ethnicity		Mean ± SD	
ETHINCITY	Mean	N	Std. Deviation
URDU	10.9932	22	3.10502
SINDHI	10.7020	5	.73418
BALOUCHI	9.8923	13	2.69922
PAKHTOON	10.1333	3	1.30512
PUNJABI	8.7689	9	3.63114
OTHERS	10.2280	30	1.65582
Total	9.9112	82	2.47807

Table showing mean values of MMP-8 among different ethnic groups



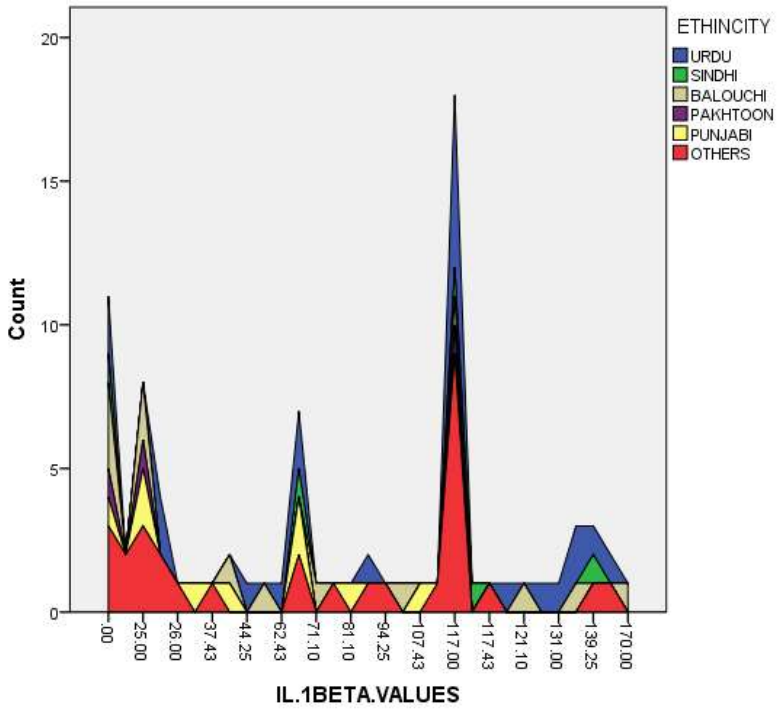
Showing Graph distribution of mmp-8 among different ethnic group

Betel activity and MMP-8 is more pronounced among individuals using chalia, results shown that this group includes patients having mild to severe values of MMP-8. However, data also displayed that mawa/gutka and combination groups shown moderate and severe cases in mainstream. Unlike MMP-8, IL-1beta was found higher in females than males. Thus, providing a knowledge gap that is yet to be discovered in future studies.



Graph showing distribution of IL-1β in male and female gender

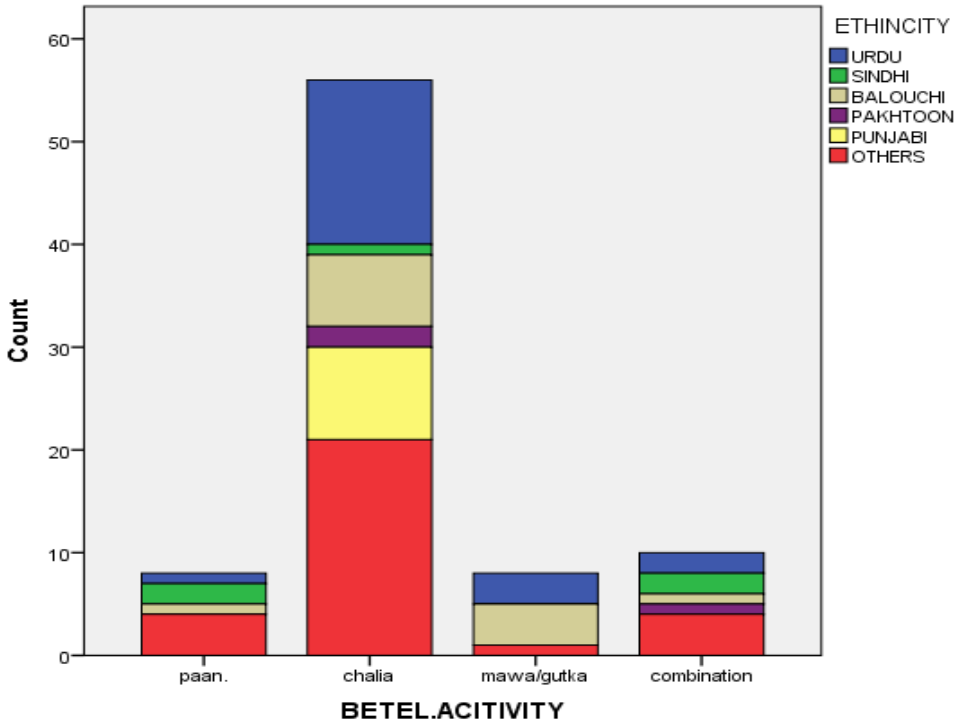
Furtl tration of b kimum concentration levels of both novel markers among all ethnic disciplines. Severity flow showed optimum levels in Urdu speaking > Sindhi speaking > Balouchi



Graph showing distribution of IL-1 β in among different ethnic groups

The most promising fact that revealed the causal relation between presence of high biomarkers

Level and prevalence of periodontitis among different ethnic group was the habit owned by specific group. The graph shown below represents the most common habit and its proportionality to different ethnic group.



Graph showing betel habits commonly practiced among different ethnic groups.

Ethnic groups had shown different levels of IL-1beta where urdu speaking group has shown highest values followed by

IL. 1BETA.VALUES / Ethnicity			Mean ± SD values
ETHINCITY	Mean	N	Std. Deviation
URDU	91.5064	22	46.27415
SINDHI	88.9000	5	55.56994
BALOUCHI	65.5989	13	57.67763
PAKHTOON	47.3333	3	61.61439
PUNJABI	50.0978	9	34.22372
OTHERS	71.7087	30	49.42422
Total	73.8362	82	49.84456

Urdu speaking> Sindhi speaking > others > Balochi Speaking > Punjabi Speaking > Pakhtoon Speaking.

Table showing mean ± SD values of IL-1β values among different ethnic group.I

Ethnicity			Periodontitis				Total
			Normal	*NSP	Stage II	stage 'III/IV'	
ETHINCITY	URDU	Count	10	4	3	5	22
		% within health.status.CAL	25.0%	40.0%	20.0%	29.4%	26.8%
	SINDHI	Count	3	0	2	0	5
		% within health.status.CAL	7.5%	.0%	13.3%	.0%	6.1%
	BALOUCHI	Count	5	3	2	3	13
		% within health.status.CAL	12.5%	30.0%	13.3%	17.6%	15.9%
	PAKHTOON	Count	3	0	0	0	3
		% within health.status.CAL	7.5%	.0%	.0%	.0%	3.7%
	PUNJABI	Count	5	0	2	2	9
		% within health.status.CAL	12.5%	.0%	13.3%	11.8%	11.0%
	OTHERS	Count	14	3	6	7	30
		% within health.status.CAL	35.0%	30.0%	40.0%	41.2%	36.6%
Total		Count	40	10	15	17	82
		% within health.status.CAL	100.0%	100.0%	100.0%	100.0%	100.0%

Table showing total number of patient in each ethnic group as per severity of disease

* Non-severe periodontitis'

DISCUSSION:

This was a baseline study focusing local population of Karachi. Its sought to assess trends of periodontal disease among different ethnic groups residing in Karachi. This study has surfaced the prevalence of periodontitis among different major and minor aboriginal groups. Another advantage is that, it highlighted the knowledge gap for future studies.

Karachi being an industrial hub of Pakistan – is very diverse in geography,culture ,traditions, habits and even race. This diversity also extends to literacy rates, health indicator rates infant mortality rate (IMR) and hygiene practices. This variation is reflected in the periodontitis prevalence. It showed that there was difference in prevalence of periodontitis among different ethnic groups.

The study made use of most updated case definition of periodontitis with internationally recognized tool of assessing GCF sample. Its recommends future studies focusing on specific ethnic groups with large sample size to study the trends of disease and its patterns in full depth and details of lifestyle, habits and confounding factors.

Comparing the prevalence of periodontitis in this study with previous findings in Karachi is not straight forward because of lack of study in this domain, also that different case definitions have been used in this study that is present in the previous studies. Therefore, it limits the discussion of study with locally conducted studies that were related to it. The prevalence of periodontitis in indigenous people in Australia [29,30] , Canada [31], New Zealand [32] and USA [33] is reported to be higher than in their non-indigenous counterparts, and the odds of having advanced periodontal disease is also higher [34,35].

In the current study multiple new and different results are obtained revealing versatile patterns of prevalence among different ethnic group. Bio markers has shown variability of periodontal disease presence among different races .Such that matrix metalloproteinase -8 is found highest among Urdu speaking group .This ethnic group also showed peak levels of interleukin 1-β. Keeping a periodontal prevalence under observation, the data reflected stage III/IV category of cases from "Others" ethnic group (41.2%) in which Memons and Bohri were most populous followed by Urdu speaking (29.4%) > Balochi speaking (17.6%) > Punjabi speaking (11.8). Stage - II was found prevalent among "Others" Memons and Bohri ethnic population (40.0 %) followed by Urdu Speaking (20.0%) and Sindhi speaking, Balochi speaking, Punjabi speaking

represented similar results (13.3%) and while non-severe form of periodontitis was most common in Urdu speaking group (40%) followed by Balochi and Others ethnicity (30%).Among all groups most healthy individual who showed up in the outpatient department were from Others too with most of them belonging to Memons and Bohri's cluster (35.0%) followed by Urdu Speaking(25.0%)> Blochi speaking and Punjabi (12.5%) > Sindh speaking and Pakhtoon Speaking (7.5%) . These results emphasizes the need to conduct more study in local population with equal participation from all ethnic groups to elicit the periodontal disease trends and its variation .Moreover, it is essential to conduct studies on each group with large sample size, as the results obtained from this study may be ascribed to the number of individuals who reported to the OPD with certain complaints or routine dental checkups, or inadequate contribution of study samples. Therefore, this study has laid the foundation to diagnose the disease with reproducible novel biomarkers that are most pertinent to periodontal disease, this study also projected the ethnic disparity based on differences of lifestyle, habits and socioeconomic triad, and it also has identified the knowledge gap regarding causal relation among different ethnic groups and their para-functional habits of eating. That is required to be studies in full length.

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