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Assessment Of Periodontal Status And Periodontal Treatment Requirement In Hospitalized Cardiovascular Patients: A Cross-Sectional Study

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Abstract:
Background: *Periodontal intervention in cardiovascular patient have been well researched. The impact of periodontitis is biologically plausible through the circulating periopathogens which directly or indirectly induce systemic inflammation. The poor oral hygiene during the hospitalisation and the oral hygiene neglect further adds to the bacterial load on periodontal structures as well. Hence, we made an attempt to identify the periodontal changes in hospitalised cardiovascular patients and determine the required periodontal treatment modalities for periodontal care.*
Objectives*: The aim of this cross-sectional study is to evaluate oral hygiene status and periodontal conditions among the cardiovascular disease's patient during their hospitalization.*
Materials and methodology: *The study included 32 hospitalised cardiovascular disease patients in Jayadeva institute of cardiology in Kalaburagi district under the physician's guidance were examined for periodontal status. Demographical, systemic conditions and periodontal diseases assessment were registered.*
Results*: Poor periodontal status was observed in the hospitalized cardiovascular patients with generalized bleeding on probing indicating the severity of periodontal disease due to compromised oral health during their stay in hospital. A mean pocket depth of 7.78mm, generalized recession, grade 1 mobility: 94.3%, grade 2 mobility: 97.1%, grade 3 mobility: 71.4%. missing teeth < 10 = 60%, > 10 = 40% were suggestive of exaggerated state of existing periodontitis and its impact with increasing inflammatory mediators in compromised cardiovascular disorder.*
Conclusion*: poor periodontal conditions was increased in hospitalised hypertensive patient in correlation with other cardiovascular risk factors. In our study we could determine the lesser role of dental /staff assistants in the wards to provide oral hygiene instructions and educate the patients about the need to keep their oral cavities healthy.*
Key words*: Hospitalised cardiovascular risk patients, Periodontitis, Two-way relationship*

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I. Introduction

Data available from the latest Global burden of diseases shows that dental services particularly the periodontal treatment unfortunately is minimal reaching the world population. Severe periodontal diseases manifested with 7.8% among the hospitalised systemically ill patients.

Cardiovascular diseases are amongst the most prevalent and significant diseases in developed countries. Disorders of the blood vessels, hypertension and arterio- sclerosis are now the chief causes of death in the western world.[1] It is thus not surprising that this group of diseases have an impact on each other with common etiopathogenesis. Smoking, stress, increased age, social economic factors are common etiopathogens. The American heart association through observational studies have supported the two-way relationship between periodontal diseases and cardiovascular diseases. Long standing periodontitis leads to a systemic inflammatory response which elicits as well as exacerbates the cardiovascular disease process in the body.[2]

The literature review suggests hypertension as risk factor for periodontal disease and cardiovascular diseases however other hospitalised cardiovascular risk patients are less studied. Hence, our survey was conducted to determine the detailed oral health guidance that is critical for the hospitalised cardiovascular risk patients.

II. Materials and methodology

A hard copy questionnaire comprised of 15 questions, to determine the oral hygiene practice and periodontal status. A proforma comprising of periodontal parameters for BOP, Plaque score and periodontal findings: Gingiva index (Loe and Silness), Plaque index (Silness and Loe) Russel's Periodontal index, and Probing pocket depth was been assessed.

The participants comprising Male and Female were included.

Demographic data such as name (optional), age, sex, occupation, place, and address were included.

Sample size: A total of 32 hospitalized patients admitted to Jayadeva heart institute of Kalaburagi district were randomly selected for the study.

Inclusion criteria and exclusion criteria:

The patients included in this study were above 18 years of age of both sexes, admitted for any type of cardiovascular diseases and participants' willingness for this survey were included.

Pregnant and lactating women, patients below 18 years of age were excluded from this study.

Table1: Questionnaire to the patient

1) Number of days of patient's admission in hospital
2) Type of Risk factors in cardiovascular condition
3) Type cardiovascular treatment received
4) Whether the patient is associated with any other systemic diseases
5)Mention a drug history
6) Do u have unsatisfactory diet
7) Dental problems faced during hospitalization
8) If present, have they managed to treat
9) Simplest oral hygiene method used by the patient
10) whether they require dental assistance during hospitalization
11) Whether any support is provided by the hospital for dental assistance
12) Do you know the impact of poor oral health on systemic illness
13) How often the patient visited for regular check-up for prevention of oral diseases
14) Do you have oral health unit in the hospital
15) Is there pain associated with any tooth? if yes mention the tooth number

Data analysis: In this cross-sectional study, data analysis was performed using the IBM SPSS Statistics for window software, v.25.0 (IBM crop., Armonk, USA). Blood pressure level was described as a quantitative variable and expressed in mmHg. The mean and standard deviation (M+SD) were calculated and followed a normal distribution.

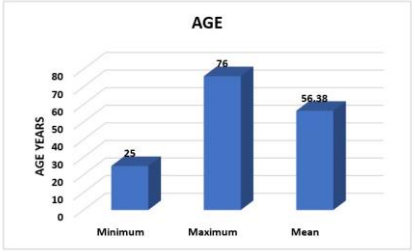
III. Results

Among the 32 patients (M=17, F=15) with a mean age of 56.38 years, 59.4% of the sample presented with hypertension showed deteriorating periodontal health and the remaining sample was associated with other risk factors (3.1%) with standard deviation of 12.978 as shown in (Figure1, table2)

Table 2: Mean age of patient

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	32	25	76	56.38	12.978

Figure:1 Demographic data (mean age)

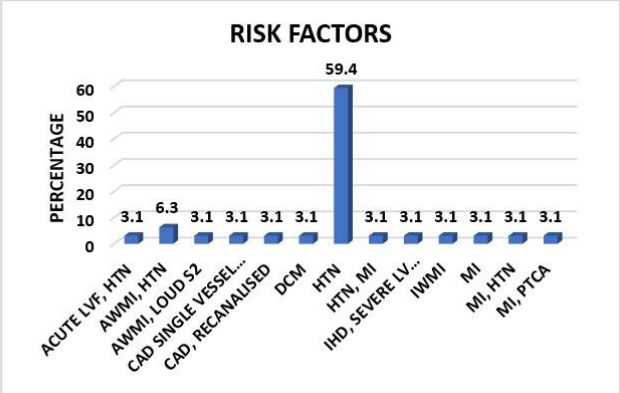


The hospitalised cardiovascular patient included in this study were associated with hypertension at greater frequency when compared to other risk factors such as acute myocardial infarction, left ventricular failure etc which comparatively occurred at lower frequency as show in (fig-2, table-3)

Tabel 3: Distribution according to type of CVS risk factors

			Frequency	Percent
	ACUTE LVF, HTN		1	3.1
	AWMI, HTN		2	6.3
	AWMI, LOUD S2		1	3.1
	CAD SINGLE VESSEL DEFECT, HTN		1	3.1
	CAD, RECANALISED		1	3.1
	DCM		1	3.1
	HTN		19	59.4
	HTN, MI		1	3.1
	IHD, SEVERE LV DYSUNCTION		1	3.1
	IWMI		1	3.1
	MI		1	3.1
	MI, HTN		1	3.1
	MI, PTCA		1	3.1
	Total		32	100.0

Figure 2: Type of Risk factors

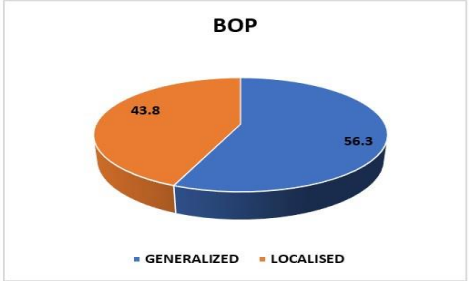


Bleeding on probing parameter of 32 hypertensive patient were depicted in pi chart which showed a generalised bleeding on probing at 56.3% and localised bleeding on probing at 43.8% as shown in (fig-3, table-4)

Table 4: Bleeding on probing

		Frequency	Percent
	GENERALIZED	18	56.3
	LOCALISED	14	43.8
	Total	32	100.0

Figure 3: Generalised Bleeding on probing

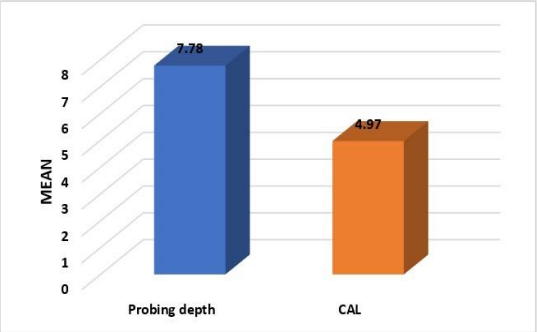


No intermediation was made at this stage by the staff in the unit, which resulted in increased **pocket formation**, with a mean depth of 7.78mm in patients with HTN. Mean clinical attachment loos was 4.97 mm in hypertensive patients and 3.20mm in patients with other risk factors as shown in (fig-4, table-5)

Table 5: probing depth and CAL

	N	Minimum	Maximum	Mean	Std. Deviation
Probing depth	32	4	13	7.78	3.210
CAL	32	3	8	4.97	1.379

Figure 4: Pocket probing depth and CAL



Among the patient examined, hypertensive patients showed different grades of tooth mobility due to exaggeration of existing periodontal diseases i.e (Grade I mobility - 94.3, Grade II mobility-97.1, Grade III mobility-74.1) and patients associated with other risk factors also showed tooth mobility which was due to poor oral hygine as shown in (fig-5, table-6,7,8)

Tabel 6: Grade I mobility

	Frequency	Percentage
Absent	2	5.7
Present	30	95.3
Total	32	100

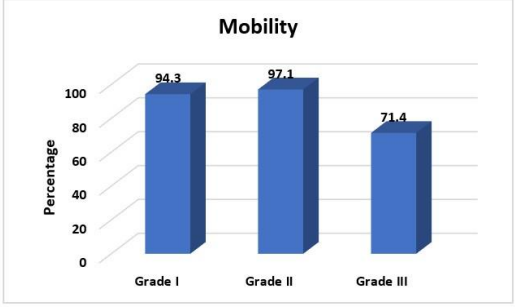
Table 7: Grade II mobility

	Frequency	Percent
Absent	1	2.9
Present	31	97.1
Total	32	100.0

Table8: Grade III Mobility

		Frequency	Percent
	Absent	10	28.57
	Present	22	71.4
Total		32	100.0

Figure 5: Grades of Mobility



IV. Discussion

The data of possible linking pathways between periodontitis and cardiovascular diseases studied are in accordance with our findings. Our study supports a positive correlation of hypertension and poor oral hygiene in hospitalised patients. Detailed family history of any existing cardiovascular disease, its severity and duration, any complications, medications, antihypertensive treatment of the same was taken through the questionnaire proforma.

It was further followed by periodontal examination. We aimed at identifying the need of standard periodontal care during cardiovascular intervention. The screening method included the following Periodontal parameters: Plaque index (Sillness and Loe), Bleeding on probing (Loe and Silness), pocket depth assessment, Clinical attachment loss and tooth mobility.

Periodontal parameters showed increased bleeding tendencies, moderate pockets with average pocket depth of 4-5mm in hypertensive patient in comparison with other risk factors and CVS disorders respectively.

Our study was correlated with study conducted by **Davide Pietropaoli** et al that increased bleeding on probing was present with hypertensive patient when compared with other risk factors. [3-4]

Pi chart representing the 32 hypertensive patients showed 56.3 % were with generalised bleeding on probing and 43.8% were with localised bleeding on probing.

This association directly corresponds to the existing studies that in hypertensive patient, changes in pathogen microcirculation can cause ischemia in the periodontium, which favours for the periodontal disease.[5-6] ***Rodrigo Martin et al*** conducted a systematic review and meta- analysis and concluded that a positive corelation exists between hypertension and periodontal parameters.[7-9] This indicates that these hospitalised patients with poor oral hygiene with risks of CVS disorders are directly related to the cardiovascular complications.

Existing Gingival diseases and periodontal diseases in hospitalised patients was found to be aggravated due to poor dexterity of brushing technique, deteriorating systemic health, which further increases the anxiety of systemic health leading to inability of maintenance of good oral hygiene.

No intervention was made by the staff in the unit at this stage, that led to the severity of increased **pocket formation**, with a mean depth of 7.78mm in patients with HTN.

Sevek Engström conducted a study regarding the association between High Blood Pressure and Deep Periodontal Pockets concluded that increased in periodontal pocket with hypertensive patient.[10-11]

Mean clinical attachment loos was 4.97 mm in hypertensive patients and 3.20mm in patients with other risk factors.

P Bouchard conducted a study to evaluate the Risk Assessment for Severe Clinical Attachment Loss in an Adult Population with hypertension and reported that subjects having high blood pressure had a significantly higher risk of **severe attachment loss** than in non-hypertensive patients.[12]

The existing mobility of the tooth which was at (Grade1: 97.1% is a main indication of bone loss, which is a sign of already existing periodontal disease, which was aggravated after intake of steroids medications. This finally led to the loss of the tooth as there was no intervention done at this stage. This led to the overall unsatisfactory diet among the patients admitted to the ward resulting in added nutritional deficiencies.

Akio Tada conducted a systematic review and meta-analysis suggests that increased risk of hypertension and higher systolic blood pressure that is associated with increased tooth loss.[13]

In moderate and advanced cases, the endotoxins (for example, LPS) of the microbial wall can stimulate the accumulation of plaque contributing to the formation of thrombi and atheroma plaque. It is very possible that this physio pathological link is the conclusive explanation of the association between the two conditions.

V. Limitation of this study

This survey has a sample size of 50 subjects, but only 32 patients were examined as the rest of the patients were reluctant to participate in this study, as these patients were suffering from major illnesses and could not be assessed clinically. This survey was conducted over a period of 3 weeks and no further follow-up was done to assess the clinical conditions of the patients at later stages of cardiovascular conditions.

VI. Conclusion

These results mainly indicate how important it is to follow basic oral hygiene procedures among hospitalized patients and the ill effects it may cause if not followed properly. Taking this into consideration, it is very necessary to implement oral health programs in the hospitals and appointment of dental staff/assistants in the wards to provide oral hygiene instructions and educate the patients about the need to keep their oral cavities healthy. Implementation of oral health programs in the hospitals and referral of hospitalised cardiovascular patients to Periodontitis can arrest the periodontal disease by targeting the common immune inflammatory pathway between periodontitis and cardiovascular disorders.

VII. Ethics approval and consent to participate

Ethical approval of study was obtained from the ethical committee of HKE.SN Institute of Dental Science and Research, Kalaburagi.

Acknowledgement

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