

# Assessment of periodontal status in subjects with metabolic syndrome

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## ABSTRACT:

**Background:** Metabolic syndrome (MetS), a serious universal health problem, is defined as the clustered presence of three or more conditions, including hyperglycaemia, hypertension, hypertriglyceridemia, low HDL-cholesterol and central obesity. The present study assessed the relationship between MetS and Periodontitis. **Materials & Methods:** In this case control study, 270 patients with metabolic syndrome aged 18-40 years of both genders (Group I) and equal number of age and gender matched healthy controls (n=270, Group II) were enrolled. Periodontal status was assessed using a community periodontal index (CPI). Score 0 (healthy), 1 (bleeding following probing), 2 (presence of dental calculus), 3 (probing pocket depth between 4 and 5 mm) and 4 (probing pocket depth  $\geq 6$  mm) was calculated. **Results:** Out of 540 patients, males were 258 and females were 282. Healthy periodontium was seen in 12% in group I and 45% in group II, bleeding in 5% in group I and 20% in group II, calculus in 20% in group I and 15% in group II, pockets 4- 5mm in 35% in group I and 13% in group II and pockets  $>6$  mm was seen in 28% in group I and 7% in group II. The difference was significant ( $P < 0.05$ ). **Conclusion:** There was poor periodontal status in patients with metabolic syndrome as compared to healthy subjects.

**Key words:** Metabolic syndrome, Obesity, Periodontal status

## INTRODUCTION

Metabolic syndrome (MetS), a serious universal health problem, is defined as the clustered presence of three or more conditions, including hyperglycaemia, hypertension, hypertriglyceridemia, low HDL-cholesterol and central obesity.<sup>1</sup>MetS is known for the risk factors of diabetes and cardiovascular diseases (CVD) independently, which is related to quality of life, therefore, interest in MetS is increasing. Periodontitis, chronic inflammation of connective tissue surrounding the teeth, reduces the masticatory function and eventually leads to tooth loss. This is a result of oral infections caused by various pathogens, and considered status of low level inflammation in the mouth.<sup>2</sup>

Some studies have reported poorer periodontal health in participants with MetS than in those without MetS.<sup>3</sup>The number of components of MetS has a dose-response relationship with loss of clinical attachment and pocket depth, which are clinical symptoms of periodontitis. Low-grade inflammation increases the levels of C-reactive protein, which is related to

increased risk of hypertension, a component of MetS. In addition, some studies have reported correlation of periodontitis with hyperglycaemia and obesity, a component of MetS. It is found that obese patients may have an increased production of reactive oxygen species and require more insulin to maintain blood glucose homeostasis, which can evolve into type 2 diabetes.<sup>4</sup> Hyperglycemia and oxidative stress promote generation of advanced glycoen end-product, which may be implicated in degeneration of periodontal tissue. In this regard, it is suggested that periodontal disease should be considered part of MetS because it is often modified by various systemic diseases such as diabetes mellitus. With the increase in the prevalence of obesity, the prevalence of MetS has increased even in adolescents and had a latent influence on the adult period<sup>5</sup>. The present study assessed relationship between MeS and Periodontitis.

## MATERIALS AND METHODS

The present case control study was conducted in department of dentistry, Dr.RKGMC, Hamirpur comprising a total of 540 patients divided into two groups. Group I included a patients with metabolic syndrome aged 18-40 years of both genders (n=270). Equal number of age and gender matched healthy controls were also recruited (n=270, Group II). All participants were informed regarding the study and their written consent was obtained. Ethical clearance for the study was obtained beforehand.

Demographic profile of each patient such as name, age, gender etc. was recorded. All underwent general health examination, including oral examination. Parameters such as height, weight, waist circumference, blood pressure, serum triglyceride, high-density lipoprotein (HDL) cholesterol and fasting blood sugar was assessed.

Patients were classified as having high risk of MetS if they had three or more of the following positive MetS parameters (According to the NCEP ATP III definition): waist circumference over 40 inches (men) or 35 inches (women), blood pressure over 130/85 mmHg, fasting triglyceride (TG) level over 150 mg/dl, fasting high-density lipoprotein (HDL) cholesterol level less than 40 mg/dl (men) or 50 mg/dl (women) and fasting blood sugar over 100 mg/dl.

Periodontal status was assessed by trained investigator using a community periodontal index (CPI). Score 0 (healthy), 1 (bleeding following probing), 2 (presence of dental calculus), 3 (probing pocket depth between 4 and 5 mm) and 4 (probing pocket depth  $\geq$ 6 mm) was calculated. Results thus obtained were subjected to statistical analysis using Chi-square test. P value less than 0.05 was considered significant.

## RESULTS

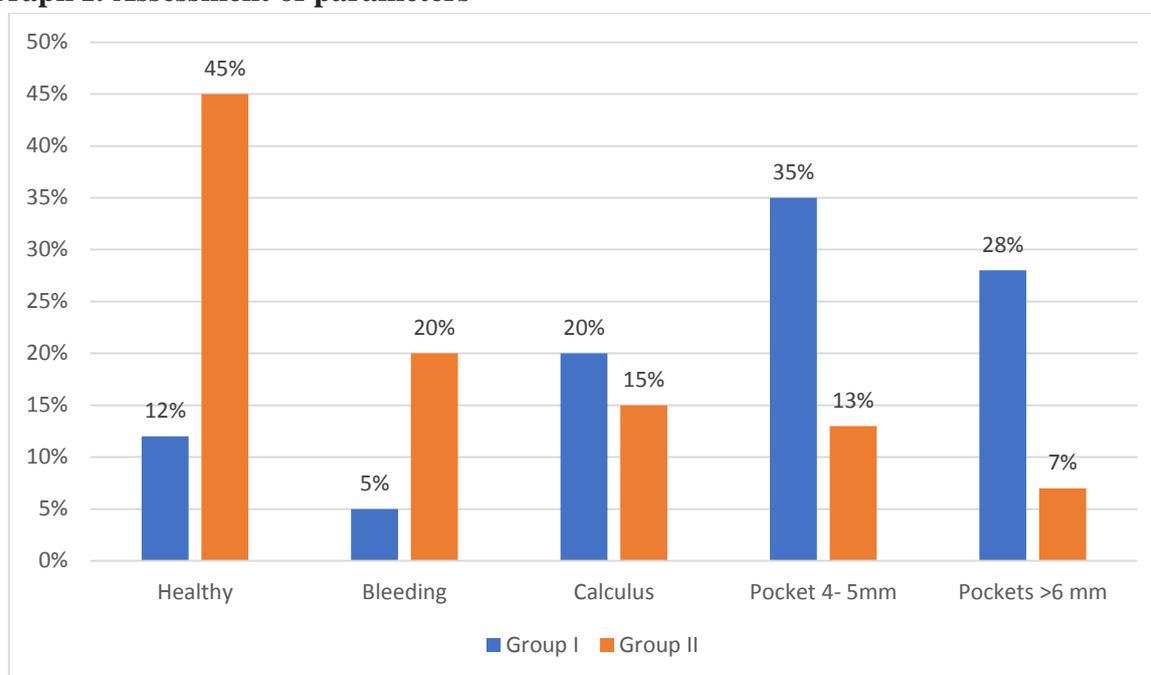
Table I shows that out of 540 patients, males were 258 and females were 282. Table II, graph I shows that healthy periodontium was seen in 12% in group I and 45% in group II, bleeding in 5% in group I and 20% in group II, calculus in 20% in group I and 15% in group II, pockets 4- 5mm in 35% in group I and 13% in group II and pockets >6 mm was seen in 28% in group I and 7% in group II. The difference was significant (P< 0.05).

**Table I: Distribution of patients**

Total- 540				
	Group 1		Group II	
Gender	Males	Females	Males	Females
Number	126	144	132	138

**Table II: Assessment of parameters**

Parameters	Group I	Group II	P value
Healthy	12%	45%	0.03
Bleeding	5%	20%	0.02
Calculus	20%	15%	0.05
Pocket 4- 5mm	35%	13%	0.04
Pockets >6 mm	28%	7%	0.01

**Graph I: Assessment of parameters**

## DISCUSSION

Obesity, insulin resistance, hypertension, and atherogenic dyslipidemia seem to cluster in the same group of individuals and are now described as part of a condition termed metabolic syndrome (MetS), associated with a strong risk of developing diabetes and cardiovascular events.<sup>6</sup> The MetS has an estimated prevalence of 17– 32% in the general population, representing a considerable public health concern. Epidemiological evidence accumulated over the last 2 decades suggests that periodontal diseases (PDs) are associated with dyslipidemia,<sup>7</sup> glucose intolerance, hypertension, and a low-grade systemic inflammatory state and with systemic diseases and conditions such as cardio-vascular disease, diabetes, and obesity. Associations between periodontitis and MetS have been suggested prevalently by cross-sectional and longitudinal investigations. However, contradictory reports have also

been published, where no association between PD and MetS was observed.<sup>8</sup> Many studies have reported high prevalence of MetS among overweight adolescents and that this syndrome developed in childhood. However, few studies have demonstrated a relationship between MetS and periodontal diseases in adolescents. Gingivitis is a kind of periodontal diseases which encompasses inflammatory as well as recessive alterations within the gingiva and the periodontium.<sup>9</sup> The present study assessed the relationship between MeS and Periodontitis. In present study, out of 540 patients, males were 260 and females were 280. Obesity ensues in decreased uptake of insulin by the liver, increased gluconeogenesis in the liver and dyslipidemia. There is a steep elevation in the TG level as a result of increase in free fatty acids. The immunologic activity of these adipokines may play a significant role in the development of IR and in periodontitis. Recent cross-sectional studies and a meta-analysis have divulged positive associations between obesity and periodontal disease.<sup>10</sup>

We found that healthy periodontium was seen in 12% in group I and 45% in group II, bleeding in 5% in group I and 20% in group II, calculus in 20% in group I and 15% in group II, pockets 4- 5mm in 35% in group I and 13% in group II and pockets >6 mm was seen in 28% in group I and 7% in group II. Yebouh et al<sup>11</sup> found that out of the total of 405 participants, 81 were males and 324 were females, and the estimated mean age was  $58.5 \pm 9.9$  years. The female patients exhibited higher mean waist circumference (WC) and mean hip circumference (HC) as well as an approximately higher body mass index than males ( $28.3 \pm 5.1$ ,  $26.5 \pm 4.2$  for the female and male respectively). Overall, the prevalence of metabolic syndrome observed among the study population was 90.6% with a higher percentage in females than males. High triglyceride levels and high waist circumference were the main risk factors for MS in the diabetic population.

A total of 20 studies were included in the review by Nibali et al<sup>12</sup>, from an initial search of 3486 titles. Only 1 study reported longitudinal data on the onset of MetS components in association with periodontal measures. However, several studies investigated coexistence. A random effects meta-analysis showed that the presence of MetS is associated with the presence of periodontitis in a total of 36,337 subjects (odds ratio= 1.71; 95% confidence interval = 1.42 to 2.03). When only studies with “secure” diagnoses were included (n=16 405), the magnitude of association increased (odds ratio=2.09; 95% confidence interval = 1.28 to 3.44). Moderate heterogeneity was detected ( $I^2 = 53.6\%$ ;  $P = 0.004$ ).<sup>12</sup>

## CONCLUSION

Authors found that there was poor periodontal status in patients with metabolic syndrome as compared to healthy subjects.

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