

# Self-reported Gingival Bleeding among Undergraduate Students and Interns of a Medical College

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## ABSTRACT

**Introduction:** Gingival bleeding (GB) is a common clinical finding in periodontal diseases. It is one of the most easy and reliable parameters for evaluating periodontal status. Self-reported GB provides vital information about periodontal diseases of a population and their periodontal treatment needs.

**Objective:** To assess the self-experience and awareness of GB among undergraduate students and interns of a medical college.

**Methods:** This descriptive cross-sectional study was conducted among 382 undergraduate students of MBBS, BDS, and Nursing at Kathmandu Medical College using online questionnaire. Participants were selected by convenience sampling from December 2021 to March 2022 after ethical clearance. Responses entered into Google Forms were exported to Microsoft Excel Sheet 2019 and descriptive analysis for calculation of frequency, percent, mean, and standard deviation was done.

**Results:** A total of 382 undergraduate students (female: 244, 63.9%) participated with ages ranging from 17-31 years. Most respondents (204, 53.4%) were from BDS. About two-third participants (241, 63.1%) experienced gingival bleeding. Most participants (260, 68.1%) believed there was a relation between the gingival disease and systemic disease. However, very few of the participants believed that antihypertensive (146, 38.2%), anticonvulsant (138, 36.1%), and immunosuppressive (166, 43.5%) drugs could increase gingival bleeding. Not even half (179, 46.9%) believed they knew about gingivitis.

**Conclusions:** Self-reported GB was seen in majority. Though many were aware about the association between gingival and systemic diseases, only few knew about the adverse effects of antihypertensive, anticonvulsant, and immunosuppressive drugs in gingiva. The gingival health awareness of undergraduate students, needs to be reinforced.

**Keywords:** Gingival bleeding; medical college; Nepal; self-report; undergraduate students.

## INTRODUCTION

Gingival bleeding is a common clinical parameter in evaluating periodontal status.<sup>1</sup> Gingivitis is the reversible inflammation of gingiva commonly due to bacterial plaque.<sup>2</sup> Gingival bleeding results from bacteriological and clinical shifts caused during initiation and progression of inflammatory periodontal disease.<sup>2</sup> It has been reported that 30% of patients with bleeding on four consecutive occasions are at high risk of further disease progression.<sup>2</sup>

Therefore, controlling gingivitis may have profound health benefits that may result in lower prevalence of destructive periodontitis.<sup>3</sup>

The behaviour of health professionals and their attitudes towards their own oral health reflect their understanding of the importance of preventive dental procedures and their efforts to improve the oral health of their patients.<sup>4,5</sup> Though there is insufficient literature, it is understood that educated people in society are more aware of the correlation between general health and oral diseases.<sup>3</sup> Hence, adequate awareness and knowledge about oral health and good oral hygiene practice will help maintain optimum oral and general health. Similarly, awareness regarding oral health among undergraduate health students can have huge impact on overall oral health of society.<sup>2,5</sup> Hence, this study aimed to assess the gingival health awareness by way of self-reported bleeding among undergraduate students at a medical college.

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## METHODS

A descriptive, cross-sectional study was conducted among 382 undergraduate students of Kathmandu Medical College (KMC) from December 2021 to March 2022 (four months) after obtaining the ethical approval from Institutional Review Committee (IRC) of KMC, Sinamangal, Kathmandu, Nepal (KMC-IRC: Ref. 2211202106).

Data were collected by the help of an online self-administered, structured, closed-, and open-ended questionnaire prepared in Google Forms (Alphabet Inc., USA) with a consent section prepared from the questions in previously published articles.<sup>1-4,6,7</sup> Pretesting of questions was done among 25 individuals who had already completed an undergraduate program at KMC and some modifications were made after feedback and analysing. As it was an online questionnaire survey using Google Forms, where only the individuals who clicked on the Informed Consent box after reading about the research information and thus consented to participate in the study could give the responses and thus participate in the study.

The questionnaire included the questions about the normal gingival features and its changes during inflammation such as: colour, size, etc., their experience of gingival bleeding, and students' reaction to address the problem whether by stopping tooth brushing and other oral hygiene measures or by visiting a dentist to manage bleeding gingiva. Additionally, the questionnaire included questions about the students' awareness about the association of gingival disease and systemic diseases. The smoking status of the population was also assessed as tobacco smoking is one of the major risk factors for periodontal disease and does affect gingival bleeding. Smokers were categorised as per the Centre for Disease Control and Prevention (CDC, USA) guidelines, that has been accepted by World Health Organisation: i) Current smoker = Smoked >100 cigarettes in lifetime and currently smoke; ii) Former smoker = Smoked >100 cigarettes in lifetime but do not currently smoke; and Never smoker = Never smoked or Smoked ≤100 cigarettes in lifetime.<sup>8</sup>

The participants were undergraduate students of KMC studying under different programs such as: Bachelor of Medicine and Bachelor of Surgery (MBBS), Bachelor of Dental Surgery (BDS), Bachelor of Nursing (BN), and Bachelor of Science in Nursing (BScN). Undergraduate students and interns of KMC were chosen because besides being future health professionals, they are the individuals competent in English language with an ability to read and understand the questions that were included in the study. The Google Forms links were shared among those students of different faculties such as Medical, Dental, and Nursing of KMC via social media (Facebook Messenger, Viber, and E-mails).

The minimum sample size of 357 was calculated by using the formula,  $n = Z^2p(1-p)/e^2$ ; where  $Z = 1.96$  at 95% confidence interval;  $p = 0.365$  (36.5% university students who experienced gum bleeding whenever they brushed their teeth) with reference to the study by Abe et al.;<sup>9</sup> and  $e =$  margin of error = 0.05 (5%) taken. Convenience sampling method was used for data collection. Total of 389 participants responded. After cleaning and filtering the data, analysis was done of 382 samples using Microsoft Excel Sheet 2019. Descriptive statistics have been presented in the form of frequency, percentage, mean, and standard deviation.

## RESULTS

A total of 382 undergraduate students of KMC filled this self-administered online questionnaire. Besides the general demographic questions, the proforma contained 20 questions on gingival bleeding experience, possible causes, and ways to prevent and seek management for the same. The age of the students ranged from 17 years to 31 years ( $22.33 \pm 2.45$  years). Among them, majority (244, 63.9%) were female. Maximum participation was from BDS students forming more than half (204, 53.4%) followed by MBBS students. Nursing students (BN/BScN) were the least in number. Among them, 71 (18.6%) fourth year students formed the minority (Table 1).

The first part of the proforma investigated the student's smoking history. It appears that 273 (71.5%) of participating

**Table 1: Distribution of participating students according to gender, faculty, and year of study, n (%).**

		BDS	BN/BSc Nursing	MBBS	Total
Gender	Female	153 (40.1)	51 (13.4)	40 (10.5)	244 (63.9)
	Male	51 (13.4)	-	87 (22.8)	138 (36.1)
Year	First year	36 (9.4)	6 (1.6)	38 (9.9)	80 (20.9)
	Second year	27 (7.1)	22 (5.8)	25 (6.5)	74 (19.4)
	Third year	49 (12.8)	14 (3.7)	17 (4.5)	80 (20.9)
	Fourth year	43 (11.3)	7 (1.8)	21 (5.5)	71 (18.6)
	Intern	49 (12.8)	2 (0.5)	26 (6.8)	77 (20.2)
Total		204 (53.4)	51 (13.4)	127 (33.2)	382

**Table 2: Smoking status of the participants according to gender and faculty, n (%).**

Gender	Smoking Status	BDS	BN/BSc Nursing	MBBS	Total
Female	Current	-	2 (0.8)	4 (1.6)	6 (2.5)
	Former	8 (3.3)	5 (2.0)	6 (2.5)	19 (7.8)
	Never smoker	145 (59.4)	44 (18.0)	30 (12.3)	219 (89.8)
Male	Current	15 (10.9)	-	44 (31.9)	59 (42.8)
	Former	11 (8.0)	-	14 (10.1)	25 (18.1)
	Never smoker	25 (18.1)	-	29 (21.0)	54 (39.1)
Total	Current	15 (3.9)	2 (0.5)	48 (12.6)	65 (17.0)
	Former	19 (5.0)	5 (1.3)	20 (5.2)	44 (11.5)
	Never smoker	170 (44.5)	44 (11.5)	59 (15.4)	273 (71.5)
	Total	204 (53.4)	51 (13.4)	127 (33.2)	382

students could be categorised as “never smokers” (Table 2).

When the students were asked if they had ever experienced gingival bleeding, more than half (241, 63.1%) responded that they had experienced gingival bleeding while 141 (36.9%) had not experienced gingival bleeding. Among them 130 (34.0%) had also experienced bad breath (halitosis) along with the gingival bleeding and 252 (66.0%) students did not report bad breath (halitosis) with gingival bleeding.

Regarding the basic knowledge of colour of gingiva, 125 (32.7%) participants thought red was the normal colour of gingiva. Most of the participants (317, 83.0%) agreed that gingival bleeding was a sign of gingivitis. When questions were posed regarding the association between systemic disease and gingival disease, 260 (68.1%) participants believed there was relation between the gingival bleeding and systemic disease. More than half (237, 62%) students agreed that diabetes patients have more gingival bleeding. When participants were asked if they thought there were

any colour and size changes during the gingival bleeding, 251 (65.7%) of them answered that there was colour change during gingival bleeding. The 264 (69.1%) participants believed that there was change in size also during the gingival bleeding. Results from this study show that 121 (31.7%) students thought that smoking increased gingival bleeding. Only 212 (55.5%) students thought that women who are trying to conceive and are already pregnant should be referred to a dentist. Many were doubtful about it some believed it was not necessary (Table 3).

Less than half of respondents (179, 46.9%) knew about gingivitis (Figure 1). Of all, 291 (76.2%) respondents thought gingival bleeding was mainly caused due to poor oral hygiene rest thought due to hard toothbrush and hard foodstuffs (Figure 2).

When multiple responses were sought for general questions like: when the respondents thought gingival bleeding was more common? The participants also expressed different

**Table 3: Responses to the questions on gingival bleeding, n (%).**

Questions	Yes	No	Maybe
Is red the normal colour of gingiva?	125 (32.7)	208 (54.5)	49 (12.8)
Is gingival bleeding a sign of gingivitis?	317 (83.0)	12 (3.1)	53 (13.9)
Is gingival bleeding associated with systemic conditions?	260 (68.1)	23 (6.0)	99 (25.9)
Is gingival bleeding associated with hormonal changes?	213 (55.8)	46 (12.0)	123 (32.2)
Do individuals with diabetes have more gingival bleeding?	237 (62.0)	24 (6.3)	121 (31.7)
Is there any colour change in gingiva when bleeding occurs?	251 (65.7)	44 (11.5)	87 (22.8)
Is there any size change in gingiva when bleeding occurs?	264 (69.1)	38 (9.9)	80 (20.9)
Does smoking increase gingival bleeding?	121 (31.7)	126 (33.0)	135 (35.3)
Do you think women who are trying to conceive or are already pregnant should be referred to a dentist?	212 (55.5)	23 (6.0)	147 (38.5)
Can antihypertensive drugs increase gingival bleeding?	146 (38.2)	54 (14.1)	182 (47.6)
Can anticonvulsant drugs increase gingival bleeding?	138 (36.1)	36 (9.4)	208 (54.5)
Can immunosuppressant drugs increase gingival bleeding?	166 (43.5)	31 (8.1)	185 (48.4)
Is gingival bleeding associated with otitis media/externa?	65 (17.0)	88 (23.0)	229 (59.9)
Is gingival bleeding associated with history of asthma?	53 (13.9)	108 (28.3)	221 (57.9)

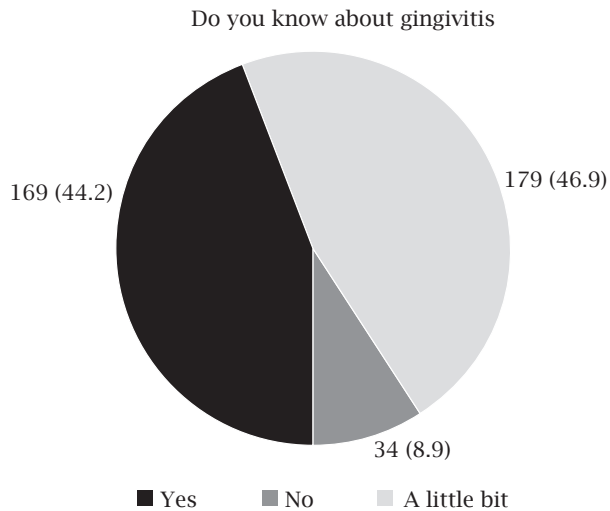


Figure 1: Knowledge about gingivitis, n (%).

views for the management of gingival bleeding. The majority of the participants thought gingival bleeding was more common during brushing and the best way to manage gingival bleeding was by visiting a dentist, followed by warm saline mouth rinse, and using prescription mouthwashes. Some also thought bleeding can be stopped by not brushing. When an open-ended question was asked regarding whether they have experienced gingival bleeding? OR If they have not experienced gingival bleeding, when did they think gingival bleeding was more common? Most participants responded as during toothbrushing.

## DISCUSSION

Periodontal disease can be painful or sometimes go unnoticed. Hence people more often than not, recognise it only when it reaches to its advanced stage, by then the prognosis becomes poor.<sup>2,7</sup> Gingival bleeding is a sign of moderate gingivitis and unfavourable response to periodontal treatment.<sup>2</sup> Therefore, awareness and knowledge of this disease are of paramount importance to prevent it and maintain optimum periodontal health.<sup>2,4-6</sup> Bleeding of gingiva either spontaneously or by mechanical stimuli (brushing or upon probing) is amongst the early signs of gingival inflammation and is considered as a predictor of poor prognosis in patients with periodontitis.<sup>8</sup> Designing the questionnaire in this way allowed the authors of this study to assess the level of understanding among the students. Students and interns in medical colleges are equipped with various information on health and diseases. Yet the awareness of this early sign of periodontal disease is variable. So, this study was conducted to assess the self-experience of gingival bleeding among the students and interns and their knowledge on aetiology, pathogenesis, and management of gingival bleeding.

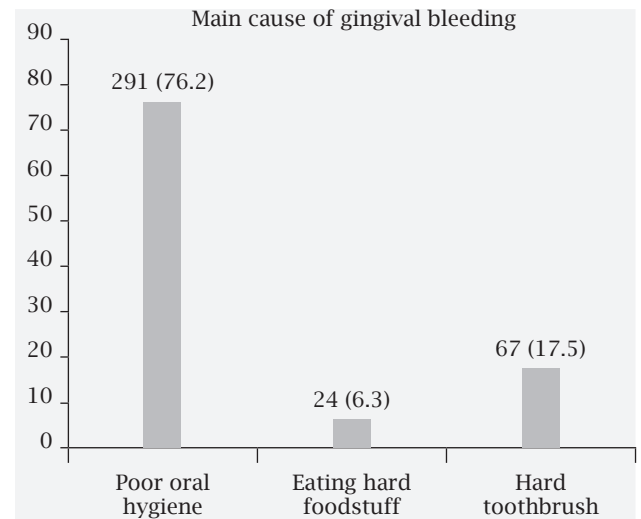


Figure 2: Participants response to main cause for gingival bleeding, n (%).

Normal colour of gingiva is referred to as “salmon pink” or “coral pink”, but it can vary from light pink to deep brown or black based on the degree of keratinisation, vascularisation, and pigmentation.<sup>2,8</sup> Change in the colour of gingiva is an earliest clinical sign of inflammation and is of clinical value as it is considered a sign of mild gingivitis. Majority of the participants (208, 54.5%) recognised that red is not the normal colour of gingiva but a lot of them (125, 32.7%) considered red as the normal colour of gingiva. Whereas a few of them, were uncertain about the colour of gingiva. This could be due to the fact that colour itself is a subjective measure and people tend to describe it differently.<sup>2</sup>

When the students were asked if they had ever experienced gingival bleeding, more than half (241, 63.1%) responded that they had experienced gingival bleeding while 141 (36.9%) had not experienced gingival bleeding. This was similar to that reported by Zorab et al. in Iraqi dental students where 98 (32.6%) had not experienced gingival bleeding.<sup>2</sup> When asked if they had experienced bad breath (halitosis) along with gingival bleeding, 130 (34.0%) reported in affirmative. This was similar to that reported by Zardawi et al. in Iraqi dental students where 125 (41.7%) reported to have experienced bad breath.<sup>7</sup> Similarity could be due to similar participating population. It is also common to experience bad breath along with gingival bleeding as the aetiology for both the conditions are similar. The prevalence of self-reported gingival bleeding (241, 63.1%) was also similar to the study done in French population (63.2%) and reported by Veynachter et al. and Baudet et al.<sup>1,4</sup> That study was done in adult population and both French and Nepali studies had similar group of smokers (70.3% never smoker in French study while 273, 71.5% individuals were “never smokers” in current study). However, it was in contrast

with the Brazilian study done by Nadanovsky et al.<sup>6</sup> which reported only 18.4% answered positively for gum bleed and in a Japanese study reported by Abe et al.<sup>9</sup> showed only 36.5%. The difference could be due to different geography and age of the population. The Brazilian study was done in a younger age group ranging from 12-17 years old, whereas the age in current study ranged from 17-31 years. The Japanese study was a retrospective review among medical freshman students with ages ranging from 17-19 years. This might imply that the Brazilian and Japanese young population have better gingival health than Nepali.

There are some systemic diseases, conditions, and medications that increase the likelihood of periodontal disease and gingival bleeding such as patients with diabetes mellitus, nutritional deficiency, and immune deficiency.<sup>1,2,5,8-12</sup> Majority of the participants (260, 68.1%) believed that there was a relation between gingival bleeding and systemic conditions and only a few (23, 6.0%) believed otherwise.

Diabetes mellitus increases the chance of gingivitis as well as periodontitis.<sup>8,13,14</sup> Majority of the participants (237, 62.0%) agreed that patients with diabetes have more gingival bleeding. This was similar to that reported in university students of Jordan where 597 (65.9%) students thought that diabetes mellitus can increase the chance of developing gum disease.<sup>3</sup> It could be because of similar age and faculty of study population. Individuals from health sector are more aware of the links between oral health and diabetes.

Similarly, hormonal changes during pregnancy increase the chance of gingivitis.<sup>5,8,11,12</sup> More than half (213, 55.8%) of the participants believed that there was an association between hormonal changes and gingival bleeding. This could be due to the fact that students and interns of a medical college have more knowledge of the various hormonal effects, systemic diseases, and conditions.

Gingivitis causes the gingiva to be red and enlarged. Majority of the participants (251, 65.7%) believed that there are colour and size changes during gingival bleeding. This was similar to study done in Jordan university students.<sup>3</sup> It could be because of similar age group of the population. Majority students in Jordanian study belonged to health sector (pharmacy, medicine, nursing, applied medical sciences).

Smoking has been identified a major risk factor for periodontal disease and many studies have shown poor response to periodontal treatment in a smoker than a non-smoker.<sup>8,13</sup> However, smoking has been known to mask gingival inflammation and smokers experience less bleeding on probing than non-smokers. This confusion was reflected in the participants' responses where one-third participants

chose each of the options: Yes (121, 31.7%), No (126, 33.0%), and Maybe (135, 35.3%) when they were asked whether smoking increases gingival bleeding. This was in contrast with that reported in Jordan university students. The difference could be in the way the question was raised in both the studies. In current study, participants were asked regarding gingival bleeding whereas in the Alzammam and Almaki study they were asked regarding increase in the chance of developing gum disease.<sup>3</sup> As we know, the gum (gingival) disease is definitely increased due to smoking but not necessarily bleeding.

Women who are trying to conceive or are already pregnant should be referred to a dentist because research has shown that there is a relation between infant birth weight and maternal periodontal condition.<sup>5,12</sup> Mothers with gingivitis or periodontitis had more frequency of low birth weight.<sup>12</sup> More than half (212, 55.5%) of the participants believed that women who are trying to conceive or are already pregnant should be referred to the dentist. But an alarming number (147, 38.5%) were doubtful about it. Some antihypertensive, anticonvulsant and immunosuppressive drugs are known to cause gingivitis. Very few of the participants believed that antihypertensive (146, 38.2%), anticonvulsant (138, 36.1%) and immunosuppressive (166, 43.5%) drugs increased gingival bleeding.

It has been shown that otitis media/externa has been associated with gingivitis in late adolescence.<sup>9</sup> Only 65 (17.0%) participants agreed with it. It has also been reported that there is association of asthma with periodontal disease.<sup>8-10</sup> More than half (221, 57.9%) of the respondents were doubtful about it and only 53 (13.9%) responded positively.

Majority of the respondents had good knowledge on the cause of gingival bleeding as 291 (76.2%) believed that gingival bleeding is caused due to poor oral hygiene. However, it is alarming and noteworthy that not even half (179, 46.9%) respondents thought they knew about gingivitis and 169 (44.2%) of them only knew a little about it.

Lastly, majority (241, 63.1%) of the respondents in the current study reported to have experienced or believed to experience gingival bleeding. This is an alarming proportion. Research shows that self-reported gingival bleeding or periodontal disease is associated with the microbiological diversity of oral cavity.<sup>15</sup> It might reflect the oral health status of the participants. On the contrary, it also points at the awareness of the participants towards gingival health, which can be considered good. For health professionals to be able to prevent, treat, and control health diseases in a community or a country in a better way, they should be more aware of their own general health as well as oral health

to be specific. Though it is a simple descriptive study, it is one of its kind for Nepal as the authors could find no similar study. This study was a small attempt to increase the awareness of gingival health at undergraduate level.

The limitations of this study could be that the tool used for this study was a self-administered questionnaire, conducted among students of only one medical college resulting in a small sample size. Hence the findings cannot be generalised to all undergraduate health students of Nepal. The questionnaire had not passed proper validity tests and it was very simple in structure. Since the study was conducted by online method, the researchers were not available to explain in case of any confusion. Hence the participants might not have always understood the questions clearly before answering.

## CONCLUSIONS

The findings of this study explore the understanding and perception of future health professionals regarding gingival bleeding and its possible relation with oral health and

overall systemic health. Although undergraduate medical college students have an easy access to oral treatment and knowledge of periodontal health, like any other population, self-reported gingival bleeding was found to be prevalent among them. Furthermore, their awareness about the association between gingival disease and systemic diseases is concerning. In order to uncover the full implications and increase more understanding of oral and periodontal health, further multicentric research with larger sample size and robust study design exploring the association of self-reporting gingival bleeding with periodontal diseases is recommended.

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**Conflict of Interest:** None.

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