1 **Title:** Survey Among Medical Students During COVID-19 Lockdown: The Online Class Dilemma

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42 **Discussion Points:**

1 1. Lockdown period: Role of technology in medical education

2 2. Mode of platforms used in learning classes

3 3. Survey among students of virtual learning classes

4 4. Attitude of students and factors adversely affecting the learning process

5 5. Insights and suggestions from participants

6

12

1 **ABSTRACT.**
2
3 **Background:** In view of COVID-19 lockdown in India, many colleges started online classes. This study aimed
4 to evaluate the attitudes of, and the factors affecting, medical students attending online classes during
5 lockdown.
6 **Methods:** We designed an online questionnaire with open-ended, close-ended, and Likert scale questions.
7 Links to the questionnaires were shared with the medical undergraduate students who have attended at least
8 one online class during the COVID-19 lockdown period. Respondents were 1061 participants from 30 medical
9 colleges from the states of Kerala and Tamil Nadu in India.
10 **Results:** The majority of students – 94 % (955/1016) – used smartphones to attend online classes. ZOOM/
11 Skype – by 57.1 % (580/1016) – and Google platforms – by 54.4 % (553/1016) – were commonly used.
12 Learning at leisure – 44.5 % (452/1016) – was the top reason why students liked online classes, whereas
13 network problems – 85.8 % (872/1016) – was the top reason why students disliked them. Lack of sufficient
14 interaction – 61.1% (621/1016) was another reason why students disliked online learning. More than half the
15 participants – 51.7% (526/1016) – did not want to continue online classes after COVID-19 lockdown. More
16 students – 55% (558/1016) – favored regular classes than online classes.
17 **Conclusion:** Students in our survey did not seem favorably disposed to online classes. Network problems
18 experienced by students should be addressed. Furthermore, teachers should try to make the classes more
19 interactive and educational institutions should address the problem pointed out by the students in order to
20 make online classes more effective in the future.
21
22 **Key Words**: COVID-19, Lockdown, Cross-sectional survey, Undergraduate medical education, Medical
23 students (Source: MeSH-NLM)

INTRODUCTION

Coronavirus disease (COVID-19) has been reported in 216 countries and has affected more than 5.4 million people[1]. The World Health Organization (WHO) on March 11, 2020 declared this disease to be a pandemic[2]. The first case of COVID-19 in India was confirmed on January 30,2020[3]. In order to contain the spread of disease, India declared a national lockdown starting from 24 March 2020[4]. Even with increased pathogen exposure, additional working hours, stigma and violence, health care workers still continue to be on the front line for preventing and treating COVID-19 disease. Educational institutions were shut down because of the lock-down; however, many medical students all around the world were involved in voluntary duties to control COVID-19. Colleges started online classes to ensure continuity of education. India is not new to online education. Study Webs of Active-Learning for Young Aspiring Minds (SWAYAM), an integrated web portal, conducts online education from the high school to the university level[5]. However, being a developing country, many areas of India lack reliable network and internet coverage. Many students cannot simply afford the extra cost and equipment needed to utilize online learning to its full potential.

Medical undergraduate education (MBBS) is a four and a half years program with one-year compulsory internship in hospitals. With 542 medical colleges and with a capacity of almost 79,000 medical students[6], updated competency-based curriculum requires students to acquire experience in various practical skills. Understanding complex pathologies and procedures demands more interaction and discussions with teachers. This is not possible without clinical rotations. The final year undergraduates spend most of their time on hospital wards, perfecting their history-taking and examination skills prior to university exams.

The use of technology in education is inevitable and online education seems to be the only logical solution during lockdown. From creating email and connecting via WhatsApp groups, now communication is mainly by web-based live video conferencing platforms (WebEx, Skype, Zoom, Microsoft Teams), and teaching web platforms (Moodle, Google Classrooms). The success of online education depends on addressing the disparity across learning resources, use of technology, communication tools and the ability to understand information from sources like computers and mobile phones[7,8]. A systematic review and meta-analysis from China in 2019 that included 16 articles observed no significant differences between online and offline learning. Furthermore, post-test test scores even showed significant improvement among students who took online learning[9]. A survey of online class participants would give us an idea of which areas to concentrate upon. With this rationale, we collected the opinion of medical students who have attended the online classes and their perceptions on continuing online classes in the "new normal" era.

Comentado [CE1]: If this is an acronym, the full term should be included here as well. Alternatively, if this term is the proprietary name for the web portal then it may be left as is and the authors may disregard this comment.

Comentado [AT2R1]: SWAYAM is a e-learning portal. it stands for **"Study Webs of Active-Learning for Young Aspiring Minds"**

Comentado [CE3R1]: Thank you. I have added the full term for the acronym here.

4

MATERIALS AND METHODS

We conducted a cross-sectional survey using Google forms. A semi-structured questionnaire comprising 25 questions was pilot-tested for the content and structure. Undergraduate medical students who attended at least one online class were included in the study. This study was approved by the Institutional Research Cell (IRC) and the Institutional Ethical Committee (IEC) of Sree Gokulam Medical College and Research Foundation, Kerala.

QUESTIONNAIRE

The questionnaires were self-administered in English using Google Forms (Google LLC, CA, and U.S.A.). It was distributed among WhatsApp groups (WhatsApp Inc, CA, U.S.A.) of students among medical colleges in the states of Kerala and Tamil Nadu. The questionnaire was available online for 48 hours (from May 03, 2020 to May 05, 2020). All the participants were informed about the aims, benefits and implication of the study and consent was obtained before starting the survey. A restriction on the number of responses from a single email-address was enforced to prevent duplicate responses from the participants. Completed data as obtained in Google forms with response rate was 100%.

The questionnaire comprised of four sections: the first section included socio-demographic details (gender, semester, government or private college, and pin code of the college). The second section included details on online classes they attended over the last 14 days (April 18, 2020 to May 02, 2020). These included types of devices, platforms used by students and duration of classes. The third section was on the students' perception of online classes. A five-point Likert scale[10] was used to determine the perception of audio, video quality, content, inter-activeness and discussion of doubts. The responses were categorized into five: very poor, poor, neutral, good and excellent. The fourth section was on students' like and dislike; suggestions and practice. We encouraged participants to select multiple answers for questions on likes and dislikes, devices, platforms, practice and suggestions. The data was extracted from the Google forms and analyzed using SPSS version 25 (Statistical Package for the Social Sciences, SPSS Inc, U.S.A) to compare the outcome of private institutions with that of government institutions.

1 **RESULTS**

2 Self-declared information from 1016 students from 30 medical colleges from the states of Kerala and Tamil

3 Nadu was included. All participants who entered the survey responded to each question. Answers on likes

4 and dislikes, devices, platforms, practice and suggestions for online classes had considerable overlap.

5 Gender and semester distributions are represented in *Table 1.* The majority of responders – 443 (43.6%) –

6 were from the sixth and the eighth semesters *(Table 1).*

7

8 **Characteristics of Online Classes** *(Figure 1)*

9 Most students – 955 (94 %) – used smart phones. ZOOM/ Skype and Google platforms were used by 580

10 (57.1 %) and 553 (54.4 %) students respectively. The majority – 667 (65.6 %) – of the students had one to

11 four hours of online classes per day. A total of 945 (93 %) attended classes lasting less than two hours.

12

13 **Students' Perception of Online Classes**

14 Participants were asked to rate five components of online class using a five-point Likert scale, which included

15 clearing doubts, interactiveness, contents of the class, audio quality and video/ image/ slide quality. This is

16 summarized in *Figure 2.*

17

18 **Students' attitude towards Online Classes: Likes and Dislikes** *(Figure 3)*

19 Learning at leisure- 452 (44.5%)-was the top reason for liking online classes, although over three-fourths –

20 797 (78.4 %) – of the participants disliked online classes. Network problems 872 (85.8 %), the need to check

21 their mobiles more often 736 (72.4 %) and the lack of interaction 621 (61.1 %) were the top factors that the

22 participants disliked about online classes. Almost half the participants – 491 (48.3 %) experienced visual

23 fatigue after attending online classes. Only 97 (9.5 %) of the participants experienced no hindrance while

24 attending online classes.

25

26 **Students' Practice of and Suggestions about Online Classes**

27 One-third of the participants – *Figure 4 A*, 328 (32.3 %) – did not do anything while attending online classes.

28 However, 688 (67.7 %) and 179 (17.6 %) students took down notes and recorded the classes, respectively.

29 We asked the students for factors that would increase their ability to participate in the class. The responses

30 were summarised in *Figure 4 B.*

DISCUSSION

To the best of our knowledge, there have been no studies on the students' perspectives of online classes during COVID-19 lockdown in India. Our survey included 1016 students from 30 medical colleges – 836 (82.3 %) from the private and 180 (17.7 %) from the government sector. This was because many government colleges have not started online classes yet. Among the participants, 673 (66.2 %) and 343 (33.8 %) were females and males, respectively. This is on par with the institutional structure. Due to temporary shutdown of schools and colleges, COVID-19 had seriously affected the education of over a billion students' world-wide. This is almost 68% of total enrolled students globally[11].

Online education is challenging in developing countries like India, because of poor network coverage in remote areas. India is second only to China in terms of internet users with the internet user penetration rate of 50%. This implies that nearly half of the country's population has no access to Internet[12]. In our study, the mobile phone was the predominant medium used for online learning 955 (94 %). Many students still use smart phones which are not optimized for attending online classes. Now, medical students have access to a wide range of learning materials during lockdown. Students can look at complex procedures and diseases that cannot be seen in remote or smaller institutions. Khurana et. al. reviewed the pros and cons of various mediums that can be used by medical students[13]. Craddock et. al. observed that pediatric residents who used an online module for learning atopic dermatitis showed statistically significant improvement in disease-specific knowledge when compared to controls[14]. Shah et. al. initiated a satellite school in India in 2006 which evoked tremendous response because of its ability to teach techniques in remote places via telemedicine[15].

In our study, ZOOM/ Skype platform was utilized by 580 (57.1 %) and Google platforms by 553 (54.4%) with overlap in use of applications. On the whole, the participants rated 'average' to 'good' for factors like video, audio, content and clearing of doubts on content covered during the lectures. Online classes lacks insufficient interaction. The general frustration of COVID-19 lockdown made 526 students (51.7 %) feel that they did not want to continue online classes. Regular classes were favored by 370 (36.4 %) whereas online classes were preferred by 81 (8 %) of the participants. Students are likely to perform better when the components of online and offline classes are mixed judiciously. This is called "blended education". E-learning modules in higher education will be successful, if teachers and students integrate online classes into the current curriculum[17,18,19]. There is practically very little experience of online classes within the existing medical curriculum. In order to observe social distancing norms, educational institutions with limited resources have to struggle to support their students. This puts an additional burden on medical teachers, who are working during COVID-19 crisis, as they have to tackle pedagogical and clinical responsibilities simultaneously. Additionally, students face many hassles while attending online classes. They are unanimous in stating that teachers must explore ways to make their classes more interactive to improve the students' attention span.

One limitations of this study was that we included the viewpoint of only students. The teachers' opinion was a part of the study; however, due to anticipated delay in data collection, we could not include their data in present study. Secondly, we included students from medical colleges in south India as they were relatively easy to access and Kerala was one of first to start conducting online classes. Thirdly, comparison between

1 government and private college was analyzed by descriptive statistics (Chi square) as we did not have a priori
2 hypothesis.
3
4 The concept of online classes is still evolving. Network problems experienced by the students should be
5 addressed. Scheduling classes in advance, trying to minimize the duration of classes and giving short breaks
6 would minimize fatigue and improve interactions. It is appropriate that educational institutions adhere to the
7 "new normal "- blended learning approach after the lockdown period.

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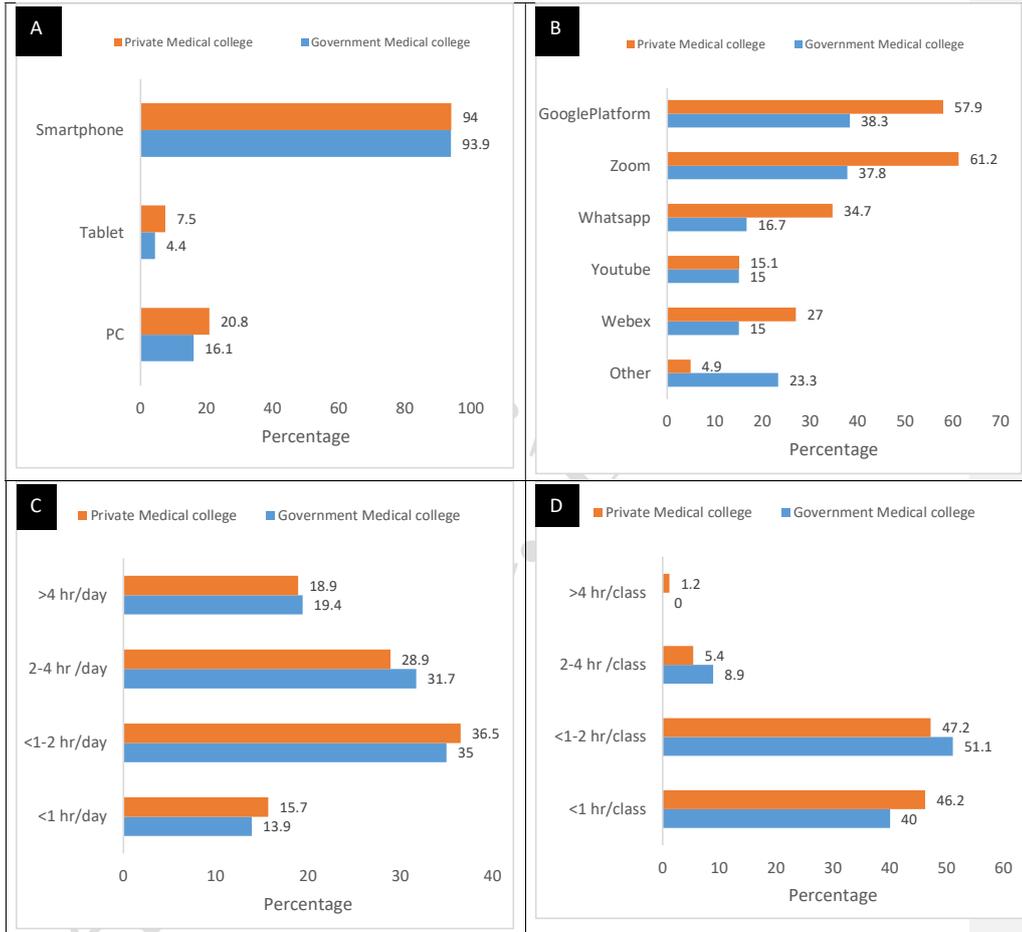4   education: enabling virtual mobility by online elective courses. Croat Med J. 2008

1 **FIGURES AND TABLES.**
2
3 **Figure 1. A. Devices B. Platforms C. Duration of Classes per day D. Duration of Average Class**
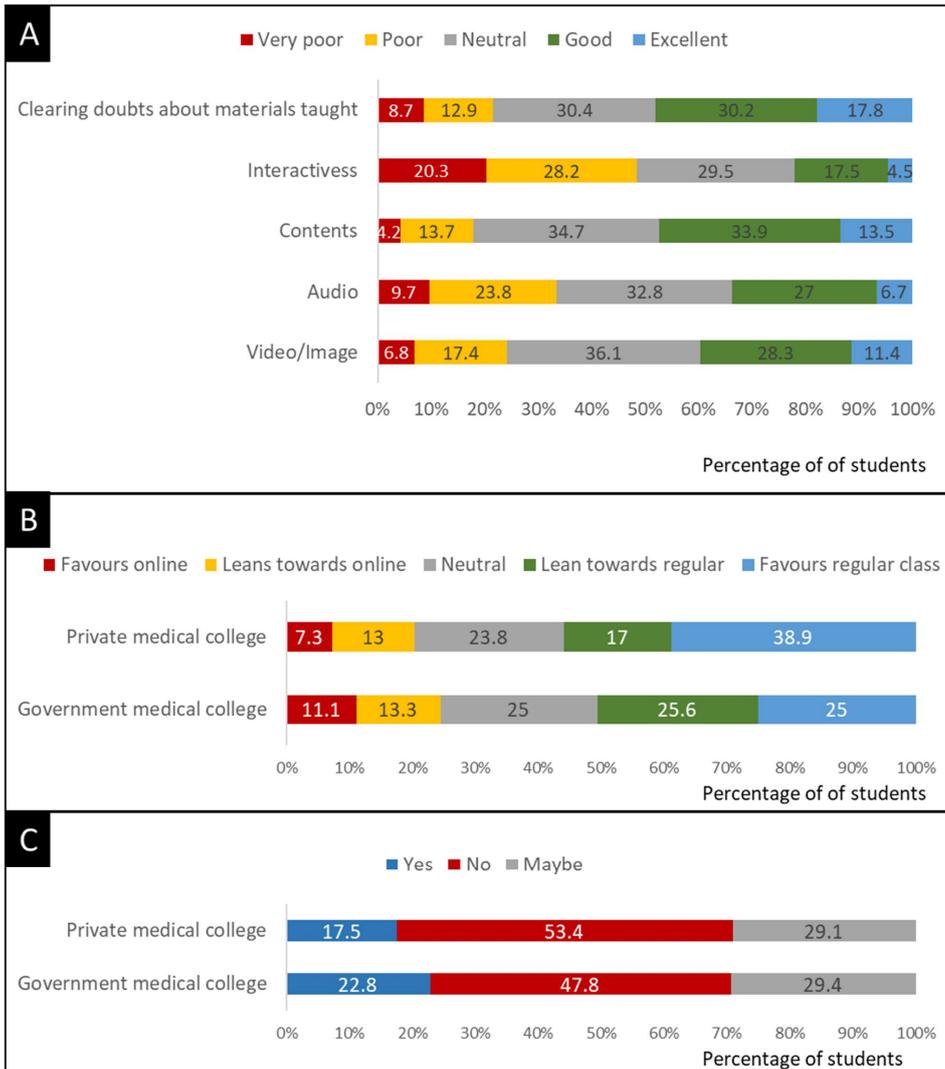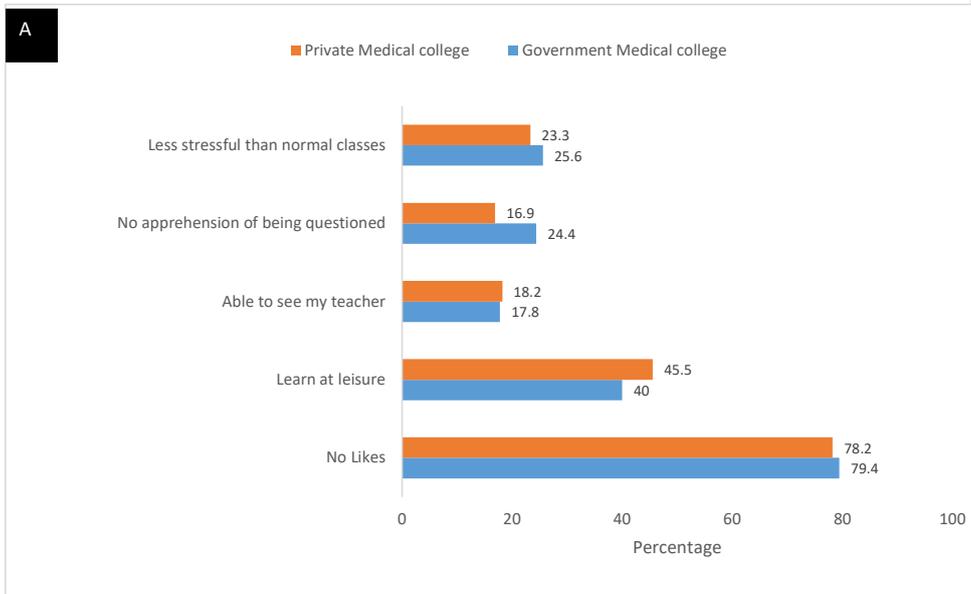4

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1   **Figure 2. Participants' Perception**
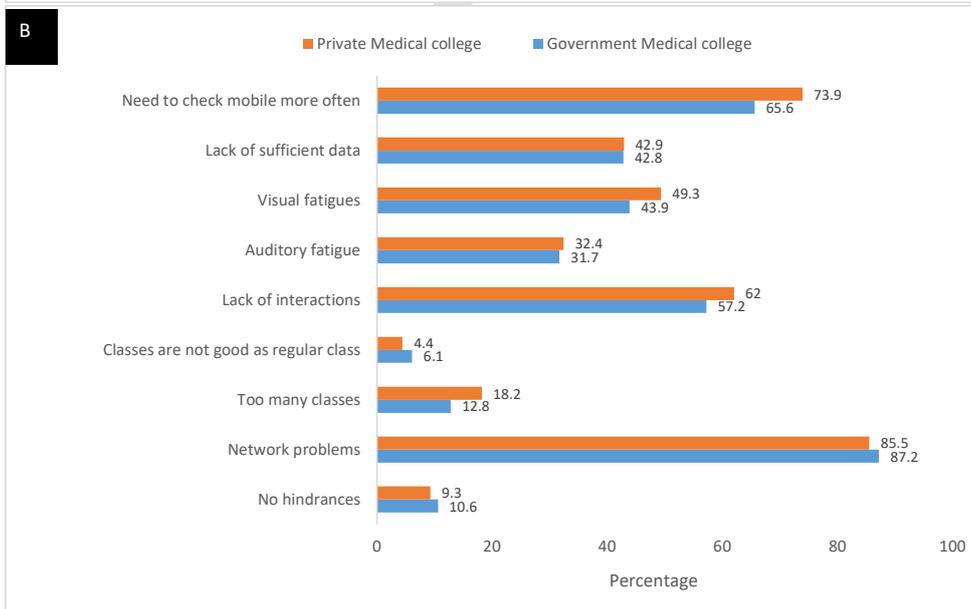2   **A. Rating B. Preference C. Whether to Continue Online Class after Lockdown**
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4

5

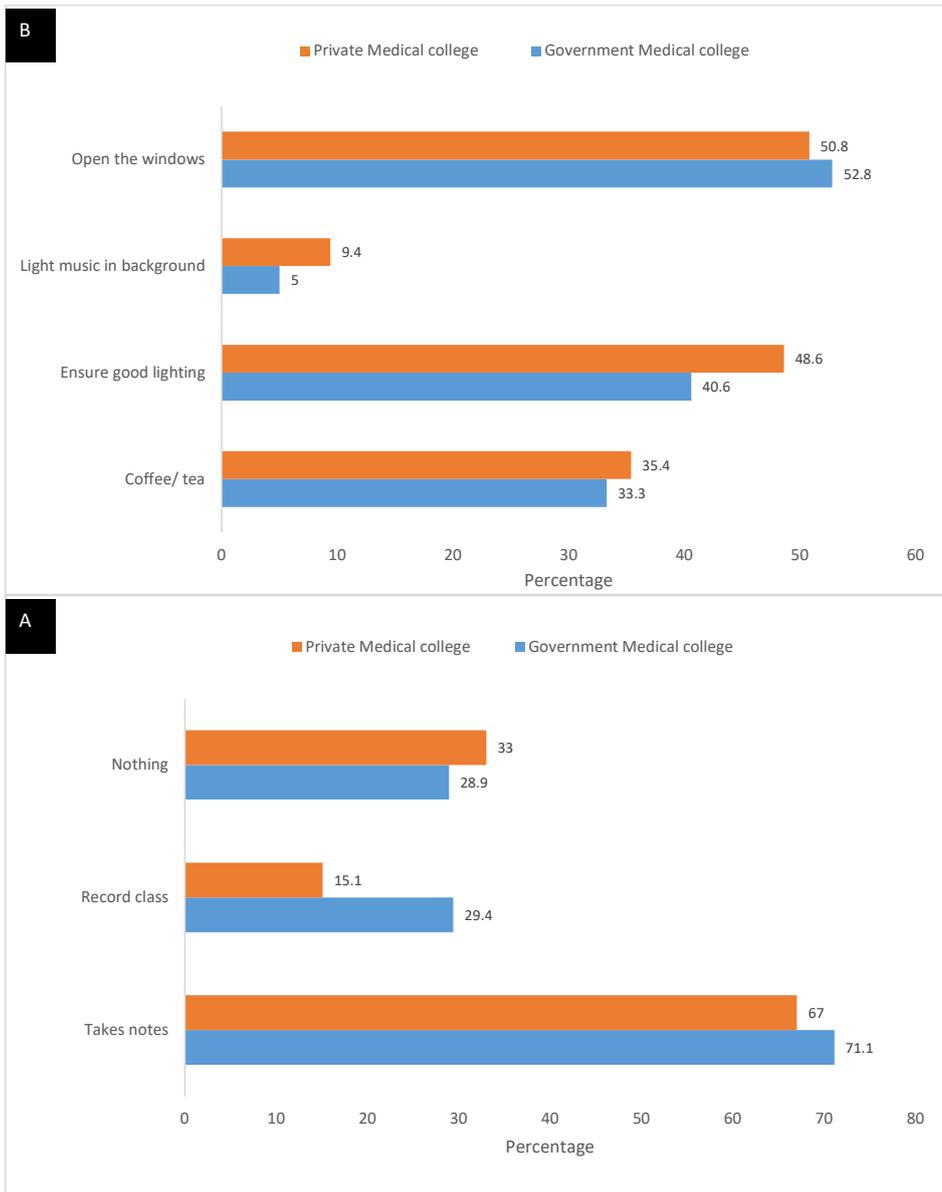**Figure 3. Participants' attitude (A) Likes (B) Dislikes regarding Online Classes**

Figure 4. Students' A. Practice B. Suggestions about Online Classes

1

Table 1. **Distribution of participants by Gender, Semester in Government and Private Medical Colleges**

2

Variables		Government Medical college		Private Medical college		Total		p
		N	%	N	%	N	%	
Gender	Male	74	41.1	269	32.2	343	33.8	0.021
	Female	106	58.9	567	67.8	673	66.2	
Semester	First and Second (1st year)	85	47.2	154	18.4	239	23.5	<0.001
	Third semester	3	1.7	60	7.2	63	6.2	
	Fourth semester	4	2.2	89	10.6	93	9.2	
	Fifth semester	2	1.1	51	6.1	53	5.2	
	Sixth semester	13	7.2	172	20.6	185	18.2	
	Seventh semester	5	2.8	46	5.5	51	5	
	Eighth semester	65	36.1	193	23.1	258	25.4	
	Ninth semester	3	1.7	71	8.5	74	7.3	

3

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