INTRODUCTION

Plagiarism is one of the most common types of research misconduct that leads to increase in the number of published papers without adding any scientific value.\(^1,\)\(^2\) It can be summarized as nothing but copying others’ work without giving original authors’ proper credit or reference for their work and showcasing it as their own work by the plagiarist.\(^1,\)\(^3\) Plagiarism not only includes copying text but also uses published pictures and tables/graphs without written permission. Many cases of plagiarism are reported in the region of Asia, Europe, Australia, and USA.\(^4,\)\(^5\) Croatian Medical Journal has reported about 11% cases of plagiarism...
over a period of 2 years.\textsuperscript{[9]} Taylor and Francis Group rejected 23% of the articles because of plagiarism in 2010.\textsuperscript{[10]}

The rising trend of “publish or perish” mantra has alarmingly increased the plagiarism cases. The reasons for plagiarizing are poor language proficiency, deficit training in scientific writing, forced educational requirements to publish articles, unawareness of the future consequences of detected plagiarism, easy access to online resources, and as an impetuous act to increase the number of publications without sufficient work.\textsuperscript{[8]} Detection of articles for plagiarism after publication cannot prevent the damage occurred to the literature if the article has reached significant audience and has received citations.

Literature shows that the awareness regarding plagiarism is substantially low among health-care students and most of them have been engaged in the act of plagiarism at least once.\textsuperscript{[9,10]} Few of the Indian studies reflected the lack of awareness toward plagiarism among medical and dental professionals.\textsuperscript{[2,11,12]} Given the limited number of studies on the dental professionals in India, this paper is an attempt to assess and compare the attitude of postgraduate (PG) students and faculty in dental colleges of Maharashtra toward the plagiarism. The secondary objective is to analyze the association of attitude toward plagiarism (ATP) with age, gender, and number of publications of the participants.

MATERIALS AND METHODS

The present cross-sectional survey was conducted on a convenient sample of dental PG students and faculty members from four dental institutes in Maharashtra state, India. Permission to conduct the study was obtained from concerned institutional authorities of all the four dental institutes, and ethical clearance for the study was obtained from the Institutional Ethical Committee. A written informed consent was obtained from the participants after explaining them the purpose of the study.

Questionnaire

Data were collected through a self-administered questionnaire which is divided into two sections. The first section consisted of demographic details of the participants and the second section consisted of the ATP questionnaire measuring three attitudinal factors: positive attitude (12 statements), negative attitude (7 statements), and subjective norms (10 statements), developed by Mavrinac et al.\textsuperscript{[2]} The questionnaire was modified from five-point to a three-point Likert-type scale [disagree, neither disagree nor agree, and agree] to facilitate the responses. This questionnaire has been validated in Croatia and has been subsequently used in other studies including studies conducted in India.\textsuperscript{[2,11,12]}

A pilot survey was conducted by self-administering the modified questionnaire to 15 faculty members and PG students [who were not part of the main study] to check for internal consistency. The value of Cronbach's alpha coefficient (internal consistency reliability) was 0.74 which is acceptable. The questionnaire was again administered to the same 15 faculty members and PG students after 15 days to determine test–retest reliability. The kappa coefficient value obtained was 0.7 which is good. Each participant was given sufficient time (on average 1 h) to fill the questionnaire. Authors tried to limit the response bias by avoiding leading questions in the questionnaire, not recording any identifiable data, and requesting participants to avoid any discussion with other participants while filling the questionnaire.

Statistical analysis

Data was collected, compiled, and analyzed using the Statistical Package for the Social Sciences (SPSS, IBM Corporation, Armonk, NY, USA) version 16. $P \leq 0.05$ was considered to be statistically significant. Descriptive statistics employed to describe the characteristics of participants. Comparisons were made for attitudinal scores between PG students and faculty members using Chi-square test. Linear regression analysis was applied to assess the association between the number of publications, age, and gender with the ATP.

RESULTS

The questionnaire was distributed among a total of 276 participants out of which 216 participants (90 faculty members and 126 PG students) returned the completed questionnaire. The response rate was 80.25% and 75.63% for PG students and faculty members, respectively.

Demographic characteristics of study participants

Table 1 shows the distribution of faculty members and PG students according to their age, gender,

| Variable          | Category | Faculty (n=90) | PG students (n=126) |
|-------------------|----------|---------------|---------------------|
|                   |          | Mean±SD Range | Mean±SD Range       |
| Age               |          | 34.86±6.87 23-60 | 26.83±2.89 23-51    |
| Gender            | Males    | 57            | 56                  |
|                   | Females  | 33            | 70                  |
| Publications      |          | 10.03±8.29 0-42 | 0.66±2.07 0-21      |
| ATP               | Positive | 22.52±5.11 12-36 | 24.66±5.13 14-34    |
|                   | Negative | 18.72±2.39 13-24 | 17.40±2.41 11-22    |
| Subjective norms  |          | 16.04±4.36 9-27 | 17.87±3.35 10-26    |

ATP=Attitude toward plagiarism, SD=Standard deviation
and publications and the mean score on ATP. For the faculty members, the mean score for positive ATP was 22.52 ± 5.11, the mean score for negative attitude was 18.72 ± 2.39, and the mean score for subjective norms was 16.04 ± 4.36. For PG students, the mean score for positive ATP was 24.66 ± 5.13, the mean score for negative attitude was 17.40 ± 2.41, and the mean score for subjective norms was 17.87 ± 3.35.

Describing positive attitude
In Table 2, both the faculty members (61.1%) and PG students (68.3%) agreed that self-plagiarism is not punishable since it is not harmful. Nearly 55.6% of the faculty members and 54% of the PG students agreed that self-plagiarism should not be punishable in the same way as plagiarism. However, both the faculty members (46.6%) and the PG students (46%) disagreed on the fact that plagiarized parts of a paper may be ignored if the paper is of great scientific value. Majority of the PG students (50%) agreed upon the statement that young researchers who are just learning the ropes should receive milder punishment for plagiarism; however, only 41.1% of faculty agreed upon the statement ($P = 0.05$). Only 21.1% of faculty members agreed to copy a part of paper already published in the foreign language as compared to 31% of PG students if one cannot write well in a foreign language ($P = 0.027$). About 72.2% of faculty members did not consider short deadline as a reason to plagiarize as compared to 46.8% of PG students ($P = 0.001$). Almost 50% of PG students agreed upon the fact of translating a part of paper from the foreign language when they do not know what to write whereas 51.1% of faculty members opposed the statement ($P = 0.046$). Nearly 62.2% of faculty members disagreed to copy from their colleagues’ paper as compared to 53.2% of the PG students who agreed to copy from their colleagues’ paper with their permission ($P = 0.001$).

| Table 2: Positive attitude toward plagiarism among study participants |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Statement                       | Faculty members | Postgraduate students |
|                                 | Disagree (%)    | Neither disagree nor agree (%) | Agree (%) | Disagree (%) | Neither disagree nor agree (%) | Agree (%) | P    |
| 1. Sometimes one cannot avoid using other people’s words without citing the source because there are only so many ways to describe something | 37.8 | 7.8 | 54 | 35.7 | 8.7 | 55.6 | 0.937 |
| 2. It is justified to use previous descriptions of a method because the method itself remains the same | 17.8 | 13.3 | 68.9 | 21.4 | 17.5 | 61.1 | 0.493 |
| 3. Self-plagiarism is not punishable because it is not harmful (one cannot steal from oneself) | 21.1 | 17.8 | 61.1 | 17.5 | 14.3 | 68.3 | 0.553 |
| 4. Plagiarized parts of a paper may be ignored if the paper is of great scientific value | 46.6 | 16.7 | 36.7 | 46.0 | 10.3 | 43.7 | 0.322 |
| 5. Self-plagiarism should not be punishable in the same way as plagiarism is | 20 | 24.4 | 55.6 | 26.2 | 19.8 | 54 | 0.500 |
| 6. Young researchers who are just learning the ropes should receive milder punishment for plagiarism | 43.3 | 15.6 | 41.1 | 27.8 | 22.2 | 50 | 0.050* |
| 7. If one cannot write well in a foreign language (e.g., English), it is justified to copy parts of a similar paper already published in that language | 68.9 | 10 | 21.1 | 50.8 | 18.3 | 31 | 0.027* |
| 8. I could not write a scientific paper without plagiarizing | 75.6 | 10 | 14.4 | 71.4 | 8.7 | 19.8 | 0.582 |
| 9. Short deadlines give me the right to plagiarize a bit | 72.2 | 5.6 | 22.2 | 46.8 | 17.5 | 35.7 | 0.001* |
| 10. When I do not know what to write, I translate a part of a paper from a foreign language | 51.1 | 15.6 | 33.3 | 36.5 | 13.5 | 50 | 0.046* |
| 11. It is justified to use one’s own previously published work without providing citation in order to complete the current work | 75.6 | 11.1 | 13.3 | 61.1 | 19 | 19.8 | 0.081 |
| 12. If a colleague of mine allows me to copy from her/his paper, I’m not doing anything bad, because I have his/her permission | 62.2 | 15.6 | 22.2 | 34.9 | 11.9 | 53.2 | 0.001* |

Chi-square test; *Indicates significant at $P \leq 0.05$
Table 3: Negative attitude toward plagiarism among study participants

| Statement                                                                 | Faculty members | PG students | P     |
|---------------------------------------------------------------------------|-----------------|-------------|-------|
| 1. Plagiarists do not belong in the scientific community                   | Disagree (%)    | Agree (%)   | P     |
|                                                                           | 35.6            | 33.3        | 0.253 |
| 2. The names of the authors who plagiarize should be disclosed to the    | Disagree (%)    | Agree (%)   | P     |
| scientific community                                                     | 13.3            | 60          | 0.001*|
| 3. In times of moral and ethical decline, it is important to discuss     | Disagree (%)    | Agree (%)   | P     |
| issues such as plagiarism and self-plagiarism                            | 4.4             | 94.4        | 0.04* |
| 4. Plagiarizing is as bad as stealing an examination                      | Disagree (%)    | Agree (%)   | P     |
|                                                                           | 15.6            | 77.8        | 0.015*|
| 5. Plagiarism impoverishes the investigative spirit                       | Disagree (%)    | Agree (%)   | P     |
|                                                                           | 51.1            | 34.4        | 0.013*|
| 6. A plagiarized paper does no harm science                              | Disagree (%)    | Agree (%)   | P     |
|                                                                           | 50              | 32.2        |       |

Chi-square test; *Indicates significant at $P \leq 0.05$

Describing negative attitude

In Table 3, about 60% of the faculty members agreed that the names of the authors who plagiarize must be disclosed as compared to 32.5% of the PG students ($P = 0.001$). Most of the study participants felt that it is important to discuss issues such as plagiarism and self-plagiarism ($P = 0.004$). Almost 77.8% of faculty members and 57.9% of the PG students agreed that plagiarizing is as bad as stealing an examination ($P = 0.001$). Most of the faculty members (58.9%) and the PG students (39.7%) agreed upon the fact that plagiarism impoverishes the investigative spirit ($P = 0.015$). Nearly 51.1% of the faculty members disagreed that a plagiarized paper does no harm to science; however, there was ambiguity in the attitude of the PG students toward the same (agreed and disagreed in almost equal proportions). About 50% of faculty members considered the plagiarism as a serious offense as compared to 31% of the PG students ($P = 0.013$). Almost 38.9% of PG students did not consider plagiarism as a serious offense.

Describing subjective norm

In Table 4, nearly 56.7% of the faculty members and 36.5% of the PG students disagreed that they are sometimes tempted to plagiarize because everyone else is doing it ($P = 0.007$). Majority of the faculty members (77.8%) and the PG students (62.7%) disagreed that they keep plagiarizing because they have not been caught yet ($P = 0.034$). Only 35.6% of faculty and 25.4% of PG students agreed that they were in a plagiarism-free environment. Most of the faculty members (70%) disagreed that plagiarism is not a big deal as compared to 42.1% of the PG students ($P = 0.001$). Majority of the PG students (57.9%) agreed that they sometimes copy a sentence or two just to become inspired for further writing; however, there was an ambiguity among faculty members regarding the same (42.2% disagreed and 41.1% of them agreed). Most of the faculty and PG students agreed that they do not feel guilty for copying a verbatim a sentence or two from their own previous paper. Most of the faculty members (53.3%) disagreed that it is necessary to plagiarize sometimes; however, 46% of the PG students felt the necessity to plagiarize ($P = 0.001$).

Association between number of publications and gender with attitude toward plagiarism

In Table 5, there was a significant decrease ($P = 0.001$) in positive ATP ($\beta = -0.195$) and subjective norms ($\beta = -0.132$) as number of publications and age of the participants increased. Negative attitude showed a significant increase ($\beta = 0.093$) as age increased ($P = 0.001$); however, it increased ($\beta = 0.015$) nonsignificantly as number of publications increased ($P = 0.528$). There was a significant decrease in positive attitude ($\beta = -1.209$) and subjective norms ($\beta = -1.298$) from males to females ($P < 0.05$); however, difference in negative ATP was nonsignificant among males and females ($P = 0.521$).

DISCUSSION

ATP is categorized into three factors: positive attitude, negative attitude, and subjective norms. Positive ATP favors the act of plagiarism and reflects acceptance of plagiarism as an act of minor importance. The negative ATP shows disapproval toward the act of plagiarism as done by others and emphasizes on negative influence of such act on academic and scientific communities, and the third factor, subjective norms toward plagiarism, represents the personal perception about the extent and acceptance of
plagiarism by the participants. PG students showed more positive ATP as compared to faculty members which reflect PG students’ approval toward committing plagiarism. Majority of the PG students considered plagiarism as a necessity instead of a punishable offense which depicts their positive perception toward plagiarism as compared to staff members. Similar results were observed in the studies conducted previously among dental faculty and postgraduate students in India.[2,11,12]

Favorable ATP decreased with increasing age and with increase in the number of publications. The findings are similar to previous studies which showed improvement in academic integrity with age.[14,15] The higher number of publications of faculty members (mean 10.03) than PG students (mean 0.66) signifies that faculty members might have developed the better writing skills and thereby leading to decreased ATP. An Indian study revealed that lack of essence of writing in English (35%) is one of the reasons leading to plagiarism;[9] however, more importantly, it is the lack of research and publication ethics and/or knowledge of what amounts to plagiarism. Female participants showed less favorable ATP as compared to male participants. These results are in accordance with previous studies conducted.[16-18]

Feamles tend to be more ethically aware than males whereas males are more risk takers than females.[16]

Reasons for plagiarizing are multifaceted: poor understanding of scientific writing, intellectual property and copyrights, and ethical issues; poor language proficiency and writing skills; unawareness of the consequences of detected plagiarism; lack of confidence in expressing thoughts; and lack of regulatory policies in the institutions. The consequences of detected plagiarism may range from retraction of published articles, blacklisting or banning the authors, loss of funding for the further research, loss of self-esteem, and dignity, and sometimes, it may cost plagiarist his/her entire career.[19] This could be destructive to the reputation of co-authors, journals, and institution to which plagiarist belongs to. An analysis of 835 retracted papers in PubMed from 2008 to 2012 revealed that India had the second highest number of papers retracted for plagiarism (18 out of total 49 papers retracted because of plagiarism; 36.2%).[20] Another study showed that 34% of retracted articles for Indian authors were because of research fraud.[21]

Plagiarism can be avoided and provided that it is a shared responsibility of authors as well as institutions. It can be avoided by the use of plagiarism detection software, developing skills in foreign languages and scientific writing, giving sufficient time for manuscript writing, using own words and ideas for the information taken from other sources, acknowledging original source for ideas, texts, or illustrations, enclosing the text in quotation marks, and acknowledging the source if it

### Table 4: Subjective norms toward plagiarism among study participants

| Statements | Faculty members | PG students |
|------------|----------------|-------------|
|            | Disagree (%) | Neither disagree nor agree (%) | Agree (%) | Disagree (%) | Neither disagree nor agree (%) | Agree (%) | P |
| 1. Authors say they do not plagiarize, when in fact, they do | 13.3 | 16.7 | 70 | 15.9 | 28.9 | 55.6 | 0.076 |
| 2. Those who say they have never plagiarized are lying | 16.7 | 40 | 43.3 | 17.5 | 27.8 | 54.8 | 0.151 |
| 3. Sometimes, I am tempted to plagiarize because everyone else is doing it (students, researchers, and physicians) | 56.7 | 14.4 | 28.9 | 36.5 | 28.6 | 34.9 | 0.007* |
| 4. I keep plagiarizing because I have not been caught yet | 77.8 | 13.3 | 8.9 | 62.7 | 27.8 | 9.5 | 0.034* |
| 5. I work (study) in a plagiarism-free environment | 40 | 24.4 | 35.6 | 43.7 | 31 | 25.4 | 0.249 |
| 6. Plagiarism is not a big deal | 70 | 16.7 | 13.3 | 42.1 | 33.3 | 24.6 | 0.001* |
| 7. Sometimes, I copy a sentence or two just to become inspired for further writing | 42.2 | 16.7 | 41.1 | 27.8 | 14.3 | 57.9 | 0.042* |
| 8. I do not feel guilty for copying verbatim a sentence or two from my previous papers | 40 | 16.7 | 43.3 | 35.7 | 19.8 | 44.4 | 0.757 |
| 9. Plagiarism is justified if I currently have more important obligations or tasks to do | 60 | 20 | 20 | 49.2 | 23.8 | 27 | 0.280 |
| 10. Sometimes, it is necessary to plagiarize | 53.3 | 20 | 26.7 | 23 | 31 | 46 | 0.001* |

Chi-square test; *Indicates significant at P ≤ 0.05

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### Table 5: Association between number of publications and gender with attitude toward plagiarism

| Independent variable | Positive attitude | Negative attitude | Subjective norm |
|----------------------|-------------------|------------------|-----------------|
|                      | β | p  | β | p  | β | p  |
| Number of publications | -0.195 | 0.001* | 0.015 | 0.528 | -0.323 | 0.001* |
| Gender               | -1.209 | 0.044* | -0.218 | 0.521 | -1.298 | 0.044* |
| Age                  | -0.147 | 0.008* | 0.093 | 0.001* | -0.150 | 0.001* |

Bivariate linear regression analysis; *Indicates significant at P ≤ 0.05
has been copied word to word and inclusion of education on plagiarism in academic curriculum.[23] While publishing others copyrighted tables, graphs, or pictures or text, authors must obtain prior permission from authors/publishers.[23]

This study has few inherent limitations. Internal validity was reasonably good, but the external validity was questionable since the study was conducted only in four dental institutions of Maharashtra state. Furthermore, only those faculty members and PG students who were actually available in the institutes during the visit were contacted and involved in the study. No further actions were taken to contact those who were not available and the nonrespondents. Like any other questionnaire study, this study was based on self-assessment and the participants responded subjectively instead of any objective measurement, and hence, some of the questions may have been answered unfairly.

**CONCLUSION**

It was evident that plagiarism was favored more by the PG students as compared to faculty members. This calls for stressing the need to highlight the issue of plagiarism among the students as well as the faculty members and inclusion of research ethics in the curriculum by the concerned authorities.

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**Conflicts of interest**

There are no conflicts of interest.

**REFERENCES**

1. Satyanarayana K. Plagiarism: A scourge afflicting the Indian science. Indian J Med Res 2010;131:373-6.
2. Gomez MS, Nagesh L, Sujatha BK. Assessment of the attitude towards plagiarism among dental postgraduate students and faculty members in Bapuji Dental College and Hospital, Davangere – A cross sectional survey. IOSR J Dent Med Sci 2014;13:1-6.
3. Barbour V. Perverse incentives and perverse publishing practices. Sci Bull 2015;60:1225-6.
4. Introna L, Hayes N, Blair L, Wood E. Cultural Attitudes Towards Plagiarism: Developing a Better Understanding of the Needs of Students from Diverse Backgrounds Relating to Issues of Plagiarism. Lancaster University, UK; 2003.
5. Masic I. Plagiarism in scientific publishing. Acta Inform Med 2012;20:208-13.
6. Baždarić K, Bilić-Zulle I, Brumini G, Petrovečki M. Prevalence of plagiarism in recent submissions to the Croatian Medical Journal. Sci Eng Ethics 2012;18:223-39.
7. Resnik DB. Editorial: Plagiarism: Words and ideas. Account Res 2012;19:269-72.
8. Deshmukh MA, Dodamani AS, Khairnar MR, Naik RG. Research misconduct: A neglected plague. Indian J Public Health 2017;61:33-6.
9. Singh HP, Guram N. Knowledge and attitude of dental professionals of North India toward plagiarism. N Am J Med Sci 2014;6:6-11.
10. Deshmukh MA, Dodamani A, Karibasappa GN, Khairnar MR, Naik RG. Knowledge, attitude and practice of postgraduate dental students towards plagiarism in Maharashtra state, India: A cross-sectional survey. ARC J Dent Sci 2017;2:1-7.
11. Bhavani Kirti P, Pratap KY, Madhavi Padma T, Siva Kalyan V. Attitudes towards plagiarism among post-graduate students and faculty members of a teaching health care institution in Telangana – A cross-sectional questionnaire based study. Int J Adv Res 2015;3:1257-63.
12. Jain S, Saxena V, Hongal S, Jain M, Torwane N, Sharma V, et al. Comparison of opinion referendum of medical and dental postgraduates towards plagiarism in Bhopal – Central India. J Coll Physicians Surg Pak 2015;25:514-8.
13. Mavrinac M, Brumini G, Bilić-Zulle I, Petrovečki M. Construction and validation of attitudes toward plagiarism questionnaire. Croat Med J 2010;51:195-201.
14. Hart I, Morgan L. Academic integrity in an online registered nurse to baccalaureate in nursing program. J Contin Educ Nurs 2010;41:498-505.
15. Nonis S, Swift C. An examination of relationship between academic dishonesty and workplace dishonesty: A multicampus investigation. J Bus Educ 2001;77:69-77.
16. Becker DA, Ulstad I. Gender differences in student ethics: Are females really more ethical? Plagiary: Cross-disciplinary studies in plagiarism, fabrication, and falsification 2007;2:77-91.
17. Poorolajal J, Cheraghi P, Irani AD, Cheraghi Z, Mirfakhraei M. Construction of knowledge, attitude and practice questionnaire for assessing plagiarism. Iran J Public Health 2012;41:54-8.
18. Yasami Z, Yarmohammadi L. Iranian postgraduate students’ perception of plagiarism. J Stud Learn Teach English 2014;2:49-63.
19. Committee on Publication Ethics. COPE. Code of Conduct and Best Practice Guidelines for Journal editors. Available from: http://www.publicationethics.org/resources/code-conduct. [Last accessed on 2017 Jul 20].
20. Amos KA. The ethics of scholarly publishing: Exploring differences in plagiarism and duplicate publication across nations. J Med Libr Assoc 2014;102:87-91.
21. Steen RG. Retractions in the scientific literature: Do authors deliberately commit research fraud? J Med Ethics 2011;37:113-7.
22. Baer WM. Plagiarism Education: Teaching Students to Use Information Ethically “Proceeding of the 2007 Midwest Section of the American Society for Engineering Education”. Available from: https://www.asee.org/documents/sections/midwest/2007/ASEMIDWESTSECTION2007_0070_22318ca8ca3e100090a58cf00945a24284.pdf. [Last accessed on 2017 Jul 20].
23. Masic I. Plagiarism in scientific research and publications and how to prevent it. Mater Sociomed 2014;26:141-6.