Prevalence of Symptoms of Depression, Anxiety, and Stress among Undergraduate Dental Students in Malaysia

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ABSTRACT

Aim: The aim of this study was to assess the prevalence of depression, anxiety, and stress among dental students and its association with factors such as gender, year of study, phase of the course, and ethnicity.

Materials and methods: A questionnaire-based cross-sectional study was conducted among medical students in a medical institute in Malaysia. Prevalence of depression, anxiety, and stress was assessed by Depression, Anxiety, and Stress Scale-21 (DASS-21).

Results: A total of 351 students took part in the study with a mean age of 22.38 (+1.69) years. The overall prevalence of depression, anxiety, and stress with varying severity among the study population was 60.4, 75.2, and 50.4%, respectively. The prevalence of symptoms of depression among the study population appears to be independent of gender, ethnicity, and academic year of study. Our results show that stress and anxiety may be influenced by gender with more prevalence in females.

Conclusion: Early detection of symptoms of depression, anxiety and stress is of great importance to take timely remedial action to keep the mental well-being of individuals. Maintaining the mental health of young medical professionals is a need of society in the present world. Further studies are suggested to recognize other factors associated with depression, anxiety, and stress among dental students.

Clinical significance: Considering the students who experience depression, anxiety, or stress during undergraduate schooling, appropriate measures shall be taken to ensure effective learning. Students who have shown higher scores shall be advised for further follow-up and treatment strategies or appropriate counseling programs.

Keywords: Anxiety, Dentistry, Depression, Stress, Students.

The Journal of Contemporary Dental Practice (2022): 10.5005/jp-journals-10024-3340

INTRODUCTION

Mental health is of paramount importance for an individual's overall health. Mental health problems can deteriorate a person's overall general health and the World Health Organization has recognized them as one of the factors that can lead to disability.[1] Mental disorders are increasingly common nowadays to an extent that every one person in six people is affected with one or other disorder and requires medical intervention. Mental disorders can be of any kind and the most explored ones are depression, anxiety, and stress. Depression is a mental disorder characterized by loss of interest and pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep and/or appetite, and poor concentration. Depressive disorders often start at a young age and often are recurrent throughout life. It can be long-lasting or recurrent, substantially impairing a person's ability to function at work, school, or cope with daily life. Stress is often known as the main factor that leads to depression. Dental education can be a significant source of stress among dental students, and studies have observed higher levels of stress among dental students than in the general population. A large body of literature examining stress in undergraduate dental students has revealed a significant increase in stress that intensifies with students' years of study.[2]

Dentists seem to be prone to professional burnout, anxiety disorders, and clinical depression because of the variety of sources of stress encountered throughout their professional career. This can even happen even as early as at the time of professional education.[3] Dental education is regarded as a complex, demanding, and often stressful pedagogical exposure involving an acquisition of required academic, clinical, and interpersonal skills during learning.[4–6] Dental students are expected to achieve a high

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degree of diverse competencies, including theoretical knowledge, clinical practice, and interpersonal skills. Currently, in Malaysia, the undergraduate dental curriculum is covered over a period of 5 years, excluding a 1-year compulsory internship. The first 2 years mainly focus on the core curriculum, including didactic or basic sciences. During the third, fourth, and fifth year, students are exposed to various clinical departments along with regular classes. At the end of each academic year, the clinical skills and theoretical knowledge of the student is judged based on oral, written, and practical examination. During the internship, students are rotated through different dental specialties to get clinical exposure.

The previous studies have implemented specific tools designed to evaluate the construct of stress only, such as the commonly used dental environmental stress (DES) scale. To assess psychological well-being, tools such as the beck depression inventory (BDI), the Maslach Burnout Inventory, the Cambridge Depersonalization Scale, the Hospital Anxiety and Depression Scale, the Spielberger State–Trait Anxiety Inventory, and the Self-rating Depression Scale have been applied independently or in combination. Thus, it would be beneficial to examine depression, anxiety, and stress using one tool rather than multiple assessments. The DASS-21 measure the three dimensions of these psychological conditions in a single, concise, and comprehensive scale.[2] Therefore, our aim is to investigate the prevalence of symptoms of depression, anxiety, and stress among preclinical and clinical students in MMMC using DASS-21.

It is important to detect symptoms of depression, anxiety, and stress in students to prevent burnout and to take appropriate remedies to maintain their mental and physical health. The previous literature shows that there is a high prevalence of stress seen in undergraduate dental students.[7] Dental education is highly demanding and requires the individual to achieve excellence in academic, clinical and soft skills within a stipulated period of time.[8] Any of these disorders can affect the student's health and result in poor academic performance, incompetency and poor patient care.[9–11] A total of five years is required for dental education in which the first 2 years will be the preclinical years and the next 3 years are the clinical years. In preclinical years, the core curriculum will be focused more on where basic science knowledge will be acquired whereas, during the clinical years, the clinical cases are allotted to the students in various specialties along with regular theory classes. The demanding nature of the dental course might put students to go through stressful situations that they have to cope with. It is important to recognize the symptoms of depression, stress, and anxiety for both the short term and long-term wellbeing of the students.

There are various studies conducted across the globe regarding depression, anxiety, and stress among student population but limited studies and paucity of information on the prevalence of symptoms of depression, anxiety, and stress among dental students in Malaysia. Most of the studies had been done locally, whereas the institution where the study was conducted had a twinning program where preclinical years are conducted in India and clinical years are conducted in Malaysia. Since the students are away from their home country for the first 2 years, that too may have effect on the mental well-being of the student when compared to the second phase of the course. Noticing the diverse and challenging situations a dental student needs to undergo prior to graduation, the authors explored the prevalence of depression, and anxiety (DAS) among dental students at a dental school in Malaysia. Authors also explored the association of factors such as gender, year of study, and phase of the dental course between the disorders. The are no such studies conducted in the region, in dental schools according to authors' knowledge and the results of the study will aid in institutions to recommend appropriate preventive and remedial measures to ensure mental well-being of students during their undergraduate professional dental course.

Materials and Methods

A cross-sectional study was conducted in a teaching dental hospital in Malaysia. Universal sampling was done, including all 351 dental students in the College, which 58 students in Year 1, 73 students in Year 2, 77 students in Year 3, 70 students in Year 4, and 73 students in Year 5. The study was conducted over a period of 10 months from January 2019 to October 2019. Ethical approval was obtained from the institutional ethical committee [MMMC/FOD/AR/B6/E C2019 (18)]. All the 351 students have given consent and participated in this study. Online surveys were distributed through Google Forms.

The short version of the standardized DASS-21 was used for this study. This is a simplified form of DASS-42 which is composed of 21 questions to calculate the score for depression, anxiety, and stress. Studies have shown that DASS 21 is as reliable as DASS 42.[12–14] In DASS-21, seven questions fall under depression, anxiety, and stress equally. The participant was asked to report themselves according to scales which are 0: Did not apply to me at all, 1: Applied to me to some degree, or some of the time, 2: Applied to me to a considerable degree, or a good part of the time, and 3: Applied to me very much, or most of the time.[15] Scores will be summed up according to three aspects which are depression, anxiety, and stress and multiplied by 2. The score will determine the category of the student. The scores of 0–9, 0–7, and 0–14 corresponds to the normal category of depression, anxiety, and stress, respectively, with scores of 10–13, 8–9, and 15–18 for the mild category, scores of 14–20, 10–14, and 19–25 for the moderate category, a score of 21–27, 15–19, and 26–33 to severe category and score about 28, 29, and 30 to extremely severe category.[16]

Data Processing and Data Analysis

After checking and coding the questionnaire, Microsoft Excel was used for data entry and SPSS, version 12, was used for data analysis. Descriptive statistics such as frequency and percentage were calculated for categorical variables and mean, and standard deviation were calculated for quantitative variables. Independent t-tests and ANOVA were used for bivariate analysis to determine if stress, anxiety, and depression were different between genders, races, academic years, and phases of the study. Multiple linear regression analysis was also used in this study. Since multicollinearity was found in the regression model, we decided to include gender, race, and academic year as our independent variables to investigate the association with stress, anxiety, and depression after adjusting other covariates. The regression coefficient and its 95% confidence interval were calculated. All statistical tests were two-sided, and the level of significance was set at 0.05.

Results

Table 1 shows the demographic characteristics of undergraduate students. The mean age and standard deviation of the students were 22.38 years (SD 1.69). Among the students, 31.3% were male and 68.7% were female. Regarding race, 8.8% were Malay, 46.4% were Chinese, and 28.5% were Indian while only 6.3% were of others ethnicity. A total of 37.6% of the students from the preclinical year and 62.4% were from the clinical year. A total of 16.5% of the participants were from the first year, 21.2% were from the second year, 21.9% were from the third year, 19.7% were from the fourth year, and 20.8% were from the fifth year (Table 1).

Among the students, 39.6% had no depression while 16.2% had mild depression, 24.2% had moderate depression, 10% had severe depression, and 10% had extremely severe. Regarding stress, 49.3% were normal, 19.7% had mild stress, 17.7% had moderate stress, 10.5% had severe stress, and 2.8% had extremely severe stress. Among the students, 24.8% were normal while 10.3% had mild anxiety, 29.1% had moderate anxiety, 12.8% had severe anxiety, and 23.1% had extremely severe anxiety (Table 2).

Table 3 shows the difference in stress, anxiety, and depression between genders, races, phases of study and academic years among

dental students. An independent *t*-test was used to determine the difference in stress, anxiety, and depression between different gender and phases of the study. There was a significant difference

Table 1: Demographic characteristics of undergraduate dental students (*n* = 351)

Variable	N (%)
Age[a]	22.38 (1.69)
Gender	
Male	110 (31.3)
Female	241 (68.7)
Race	
Malay	66 (8.8)
Chinese	163 (46.4)
Indian	100 (28.5)
Others	22 (6.3)
Academic year	
Year 1	58 (16.5)
Year 2	74 (21.1)
Year 3	77 (21.9)
Year 4	69 (19.7)
Year 5	73 (20.8)
Phase	
Preclinical	132 (37.6)
Clinical	219 (62.4)

[a]Mean (SD)

Table 2: Prevalence of stress, anxiety, and depression among undergraduate dental students (*n* = 351)

Variable	N (%)
Depression	
Normal	139 (39.6)
Mild	57 (16.2)
Moderate	85 (24.2)
Severe	35 (10.0)
Extremely severe	35 (10.0)
Mean (SD)	13.05 (9.73)
Minimum–Maximum	0.0–42.0
Stress	
Normal	173 (49.3)
Mild	69 (19.7)
Moderate	62 (17.7)
Severe	37 (10.5)
Extremely severe	10 (2.8)
Mean (SD)	1.29 (8.45)
Minimum–Maximum	0.0–42.0
Anxiety	
Normal	87 (24.8)
Mild	36 (10.3)
Moderate	102 (29.1)
Severe	45 (12.8)
Extremely severe	81 (23.1)
Mean (SD)	13.23 (8.50)
Minimum–Maximum	0.0–42.0

Table 3: Stress, anxiety and depression between different gender, races, and academic years among dental students (*n* = 351)

Variable	Stress Mean (SD)	Stress p-value	Anxiety Mean (SD)	Anxiety p-value	Depression Mean (SD)	Depression p-value
Gender[a]						
Male	13.18 (7.93)	0.002	11.58 (8.02)	0.014	11.58 (9.25)	0.055
Female	16.25 (8.53)		13.98 (8.62)		13.73 (9.87)	
Race[b]						
Malay	15.36 (8.62)	0.999	12.61 (8.51)	0.670	12.30 (9.98)	0.421
Chinese	15.28 (8.44)		12.93 (8.22)		12.66 (9.13)	
Indian	15.28 (8.58)		14.08 (8.83)		13.56 (9.78)	
Others	15.18 (8.02)		13.36 (9.27)		15.91 (12.64)	
Academic year[b]						
Year 1	14.0 (8.17)	0.162	13.59 (8.62)	0.540	12.07 (8.83)	0.104
Year 2	15.27 (9.34)		13.35 (8.67)		13.95 (11.17)	
Year 3	16.47 (7.93)		13.69 (8.39)		13.74 (8.77)	
Year 4	16.58 (8.47)		13.88 (8.57)		14.64 (9.98)	
Year 5	13.86 (8.12)		11.70 (8.32)		10.71 (9.26)	
Phase[a]						
Preclinical	14.79 (8.92)	0.391	13.48 (8.66)	0.657	13.14 (10.23)	0.902
Clinical	15.59 (8.17)		13.07 (8.42)		13.00 (9.43)	

[a]Independent *t*-test; [b]ANOVA; *p* <0.05 is significant

Table 4: Multiple linear regression analysis of the association between gender, race, and academic years and stress, anxiety, and depression among dental students

	Stress (n = 351)		Anxiety (n = 350)		Depression (n = 351)	
Variable	b (95% CI)	p-value	b (95% CI)	p-value	b (95% CI)	p-value
Gender						
Female	Reference		Reference		Reference	
Male	−1.75 (−4.00, 0.51)	0.129	−2.03 (−3.98, −0.07)	0.042	−2.91 (−4.87, −0.96)	0.004
Race						
Malaysia	Reference		Reference		Reference	
Chinese	0.53 (−2.37, 3.45)	0.719	0.28 (−2.24, 2.80)	0.825	0.48 (−2.03, 3.00)	0.706
Indian	1.03 (−2.04, 4.11)	0.509	1.26 (−1.40, 3.93)	0.352	−0.13 (−2.69, 2.64)	0.986
Others	3.51 (−1.23, 8.25)	0.146	0.48 (−3.62, 4.58)	0.818	−0.13 (−4.24, 3.97)	0.950
Academic year						
Year 1	Reference		Reference		Reference	
Year 2	2.13 (01.25, 5.50)	0.216	−0.55 (−3.48, 2.39)	0.715	1.37 (−1.55, 4.30)	0.356
Year 3	1.69 (−1.67, 5.05)	0.322	−0.01 (−2.92, 2.89)	0.993	2.29 (−0.62, 5.20)	0.122
Year 4	2.60 (−0.79, 5.99)	0.132	0.32 (−2.62, 3.25)	0.833	2.44 (−0.50, 5.38)	0.104
Year 5	−0.85 (4.27, 2.58)	0.627	−1.42 (−4.38, 1.54)	0.345	0.26 (−2.70, 3.23)	0.862

b = Regression coefficient; confidence interval (CI) = 95%; $p < 0.05$ is significant

in stress ($p = 0.002$) and anxiety ($p = 0.014$) between male and female students as female students had significantly higher stress and anxiety score than female students. However, there was no significant difference in depression between genders. There was also no significant difference of stress ($p = 0.391$), anxiety ($p = 0.657$) and depression ($p = 0.902$) between the pre-clinical and the clinical year students. A one-way ANOVA was conducted to determine if stress, anxiety, and depression were different between races and academic years. There were no significant differences in stress, anxiety and depression between races and academic years (Table 3).

Multiple linear regression was run to find the association between gender, ethnicity, academic year, and depression. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was the independence of residuals, as evaluated by a Durbin–Watson statistic of depression was 2.059, stress was 1.548, and anxiety was 1.590 respectively. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals vs unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater than ±3 standard deviations, no leverage values greater than 0.2, and values for Cook's distance above 1. Their assumption of normality was met, as assessed by $Q–Q$ Plot. The R^2-value for the overall model for depression was 3.6% (adjusted R^2 of 1.3%), anxiety was 2.5% (adjusted R^2 of 0.3%), and stress was 4.3% (adjusted R^2 of 2%), respectively.

The multiple regression model was not statistically significant for depression [$F_{(8, 342)} = 1.581, p = 0.129$] as well as for stress [$F_{(8, 342)} = 1.912, p = 0.057$] and for anxiety [$F_{(8, 341)} = 1.115, p = 0.352$]. There was no significant association between gender, ethnicity, academic year, and depression, $p > 0.05$. Regarding anxiety, gender was significantly associated with anxiety as males had a 2.03 score lower than females [$b = −2.03$ (05% CI −3.98, −0.07), $p = 0.042$]. There was no significant association between ethnicity, academic year and anxiety, $p > 0.05$. Regarding stress, gender was significantly associated with stress as

males had a 2.91 score lower than females [$b = −2.91$ (95% CI −4.87, −0.96), $p = 0.004$]. There was no significant association between the ethnicity, academic year, and stress, $p > 0.05$. Regression coefficients and their 95% confidence interval can be found in Table 4.

DISCUSSION

Depression refers to a wide range of mental health problems characterized by the absence of a positive effect, low mood, and a range of associated emotional, cognitive, physical, and behavioral symptoms.[2] Stress is anything that poses a challenge or a threat to an individual's well-being. It has been defined as a process in which environmental demands exceed the adaptive capacity of an organism, resulting in psychological and biological changes that may place persons at risk for disease.[3] Anxiety is an emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure.[4] Anxiety is often accompanied by depression, and the two share many symptoms and involve many of the same brain pathways.[4,5] University students are one group of the population possessing high vulnerability to these mental disorders. Being adolescents and handling the needs of a demanding professional course makes the situation even more delicate to succumb to stress, anxiety and depression.[6]

Depression, anxiety, and stress are common mood disorders and affect people across the globe. The previous reports state that university students possess a higher risk of being affected by DAS than the general population. There are studies conducted in different parts of the world to assess the DAS scores among students who are in medical courses and who experience higher levels of stress and anxiety due to the demanding nature of the course. We chose undergraduate dental students in Melaka, Malaysia as the study population since there is a paucity of reliable information about the prevalence of DAS in this cohort.

The percentage of participants who showed depression, anxiety and stress were 60.4, 75.2, and 50.4, respectively, ranging

Table 5: Comparison of overall DAS scores in dental, medical and university students from available studies

Study	Country	Study population	Depression (%)	Anxiety (%)	Stress (%)
Alshloul[22]	Saudi Arabia	Medical, Undergraduate	47.8	56.0	39.1
Basudan[8]	Saudi Arabia	Dental, Undergraduate	55.9	66.8	54.7
Bayram[23]	Turkey	University students	27.1	47.1	27.0
Iqbal[21]	India	Medical, Undergraduate	51.3	66.9	53
Mina[17]	Iran	Dental, Undergraduate	31.5	40.3	41.6
Shamsuddin[20]	Malaysia	University students	37.2	63.0	23.7
Wahed[18]	Egypt	Medical, Undergraduate	60.8	64.3	62.4
Yaacob[19]	Malaysia	Medical, Undergraduate	41	68.9	34.2
This study	Malaysia	Dental, Undergraduate	60.4	75.2	50.4

from mild to extremely severe. Considering the scores of Depression among the dental students, the overall score reported from other studies was 31.5% (Mina et al., Iran),[17] and 55.9% (Basudan et al., Saudi Arabia).[8] The score for depression in this study was 60.4%. The anxiety score was 75.2% in this study which is higher than the other reported studies (40.3 and 66.8%), respectively. The overall stress score in this study was 50.4% which was in between the scores reported in the other two studies (41.6 and 54.7%), respectively. Table 5 compares the DAS scores of studies conducted among different student populations that is undergraduate dental students, undergraduate medical students, and undergraduate university students (not related to health sciences). The highest score for depression was reported by medical students (60.8%, Wahed et al.)[18] followed by dental students (60.4%, this study). The anxiety score was highest in this study (75.2%) followed by 68.9% in medical undergraduate students (Yaacob et al.).[19] Higher Stress scores were reported in a study among medical students (62.4%, Wahed et al.) followed by dental students (54.7%, Basudan et al.).[8] The studies done among university students reported score above the moderate level and probably accounts for the lesser scores.[20,21]

This study shows significantly higher stress and anxiety among the female students compared to the male students, which agrees with the findings of previous researchers. According to Radeef et al. from Malaysia, female students have higher stress and anxiety compared to male students.[24] This may be due to hormonal differences or differing psychosocial stressors or stress coping mechanisms in females and males.[8,24] Male students have a higher ability to cope with stress compared to female students. A study done in Saudi Arabia by Basudan et al. also reports a higher level of stress in female students.[8] There is another study done by Sravani et al. that shows DAS score and gender were not significant.[25] Depression also was higher in female students though it was not statistically significant ($p = 0.055$).

Other studies conducted among medical students also have similar findings. Wahed et al. reported that levels of anxiety and stress were significantly higher in females.[18] The findings were consistent with the results of the multiple linear regression model since there was no statistically significant depression, anxiety, or stress. Regarding anxiety and stress, both were found significantly higher in female subjects, which agrees with the results of the independent *t*-test.

Malaysia is a multicultural country which consists of three main ethnicities which are Malay, Chinese, and Indian. Based on the study done by Teh et al., Malay students have higher chances of having anxiety.[26] This finding is also consistent with another study done by

Shamsuddin et al. among public university students, which also shows that Malay students had the highest stress score.[20] This might be due to cultural differences between the ethnicities and socioeconomic differences. Another study done by Mohammed, et al. shows that Malay and Chinese have a higher mean stress score compared to other ethnicities.[27] Our results (one-way ANOVA) showed no significant difference in stress, anxiety, and depression among the races, which was like the findings in the regression model analysis.

The dental course where this study was conducted is divided into two phases—a preclinical phase and a clinical phase. The preclinical phase of bachelor of dental surgery (BDS) (years 1 and 2) is in, India whereas the clinical phase (years 3, 4, and 5) is in Melaka, Malaysia. According to our results, there was no significant difference in depression, anxiety, and stress scores among students in different academic years. The results were similar in one-way ANOVA and in regression model analysis. The overall DAS scores among the dental students in different years of dental school appear to be inconsistently varying in the available literature. The results of a study done by Ngasa et al. show that students in the clinical phase have a higher prevalence of depression compared to students' preclinical phase. Based on the study, depression increases as the students' progress in medical school.[28] According to a study done by Mohd Nayan et al., there is no significant difference in stress, anxiety, and depression between the years of study in dental school, however, year 5 dental students showed slightly higher anxiety compared to other years.[29] In the study among Turkish university students, higher depression scores were found in senior students compared to juniors. This might be due to the increased workload in terms of academic activities along with patient treatment and management which a student in clinical years of dental course must handle.[30] Few other studies also report higher DAS scores among dental students in clinical years.[7,31] The results of this study are not in agreement with the study done by Radeef et al. which shows a higher mean DAS score in the pre-clinical phase compared to clinical phase students.[24] Authors have justified the finding that in the pre-clinical phase students experience more stress and anxiety as they just began to get exposed to academic-related dentistry and they need more time to adjust themselves to the workload and the stress faced. A study done by Sravani et al. showed overall DAS score was higher among III Year dental students. The finding was justified that the students are introduced to the clinics this year and probably the stress related to patient treatment and management.[25] Results from this study show no significant difference in stress, anxiety, and depression between pre-clinical and clinical year students. The variation in overall DAS scores of students in different years of dental

schools in various studies may be attributed to variables like dental curriculum, cultural differences, socioeconomic status, and the like.

Keeping the mental well-being of the student as one of the primary concerns, the institution shall be prepared with supportive measures to prevent the incidence of DAS. Many dental schools in Malaysia have student counseling services as an integral part of the university. An effective mentor–mentee system can be another effective approach since professionals in the field of dentistry can better understand the dental student's life in the light of their experience. It is advised to have the assessment of DAS as a standard practice in dental schools to prevent the incidence and to take appropriate interventions in the case of students with high scores of DAS. Involving the parents or guardians of students with high DAS scores will probably ensure family support for the students which will help them regain their mental health.

The study has some limitations since the participants were self-reporting and had limited options to choose without alternatives due to the close-ended nature of the questionnaire. Since the number of day scholars were minimal, the comparison based on mode of stay was not performed. Finally, due to confidentiality issues and institutional policies, academic performance of student was not considered as a variable in this study.

Conclusion

Results of this study show varying levels of symptoms of depression, stress, and anxiety among undergraduate dental students. The prevalence of symptoms of depression among the study population appears to be independent of gender, ethnicity, and academic year of study. Our results show that stress and anxiety may be influenced by gender with more prevalence in females. Considering the students who experience depression, anxiety or stress during undergraduate schooling, appropriate measures shall be taken to ensure effective learning. Students who have shown higher scores shall be advised for further follow-up and treatment strategies or appropriate counseling programs. Further studies are recommended to explore other stressors which affect the depression, anxiety, and stress scores in the student population.

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