

Digital Gaming and Psychological Well-being among Adolescent College Going Students in Puducherry, India

A PRAVEEN¹, P STALIN²

ABSTRACT

Introduction: Adolescents are vulnerable to addictions such as tobacco, alcohol, pornography, internet use etc. Due to high exposure to internet and gadgets, the involvement of adolescents in digital gaming has increased significantly in recent years. Excessive digital gaming may affect the mental health status.

Aim: To measure the prevalence of digital gaming and to assess the relationship between digital gaming and psychological well-being among college going adolescents.

Materials and Methods: A college based cross-sectional study was conducted among 415 adolescents (≤ 19 years of age) studying in arts, engineering and medical colleges located in Puducherry. The study participants were recruited using stratified multistage sampling technique. After obtaining written informed consent, study participants were interviewed using a structured questionnaire consisting of variables such as socio-demography, usage and pattern of digital gaming. Gaming Addiction Scale was used to assess the level of addiction to digital gaming. Psychological well-being score was assessed using 42 items Ryff's scale with six domains such as autonomy, environmental mastery, personal growth, positive relations with others, purpose in life and self-acceptance. Data was analysed in IBM SPSS Statistics for windows, Version 21.0 (IBM Corp, Armonk, New York). Chi-square test and one-way ANOVA tests were used to measure the p-value, $p < 0.05$ was considered as statistically significant.

Results: Out of 415 study participants, 83.1% were current or past players of digital games. Females (93%) ever played more than males (74%) ($p < 0.001$). The proportion of current/past gamers was lowest in the participants aged 17 years (49.1%) ($p < 0.001$). All engineering and arts students (100%) played the digital games either currently or in past, however it was only 48.9% among medical students ($p < 0.001$). Majority (53.6%) played in both online and offline mode. About three-fourth (76.2%) of the study participants were playing digital games at their homes. The proportion of daily playing digital gamers was higher in females (28.6%) than males (23.4%) but statistically not significant ($p = 0.215$). Total 29% of the study participants felt bad when they were unable to play games. The prevalence of addictive and problematic users among those who were playing digital games was 4.3% and 33.6%, respectively. The mean score of self-acceptance dimension of psychological well-being was lowest among current users than past and never users with statistical significance ($p = 0.046$). However, the dimension of personal growth was higher among current and never users than past users ($p < 0.001$).

Conclusion: Most of the college going adolescents had ever played digital games. There was no significant relationship between psychological well-being and digital gaming except for personal growth and self-acceptance dimensions.

Keywords: Addictive behaviour, Adolescent health, Internet addiction disorder, Mental health, Psychology, Video games

INTRODUCTION

Adolescence is an important stage of every individual's life cycle where they become both physically and mentally matured. Adolescents constitute about 20% of the world's population [1]. Common health problems among adolescents are obesity, early pregnancy and childbirth, sexually transmitted diseases, malnutrition, oral health problems, violence, addictions etc., [1]. Addictions have become an increasing concern for the society. Addiction to tobacco, alcohol, drugs and porn are commonly seen in adolescents. In this era of technology, about 20% of adolescents are addicted to the gadgets and internet [2].

In 2019, addictions to digital gaming was named as 'Gaming Disorder' by World Health Organisation (WHO) and included as a separate disease entity under International Classification of Diseases-11 (ICD-11). Gaming disorder is described as "a pattern of persistent or recurrent gaming behaviour ('digital gaming' or 'video-gaming'), which may be online (i.e., over the internet) or offline, manifested by impaired control over gaming, and an increased priority to gaming to such an extent that gaming takes precedence over other life interests and daily activities; and continuation or escalation of gaming despite the occurrence of any negative consequences. The behavioural pattern observed is of immense

severity thereby leading to a significant impairment in personal, family, social, educational, occupational or other important areas of functioning. The pattern of gaming behaviour may be continuous or episodic and recurrent" [3].

Internet addictions can lead to disturbances in sleep, eating patterns, interpersonal relationships and academic performance [4]. Uncontrolled involvement in digital games can lead to various mental health problems like loneliness, depression, anxiety etc. Some dangerous games like blue whale are increasingly being played worldwide and resulting in self inflicted injuries with few deaths also [5].

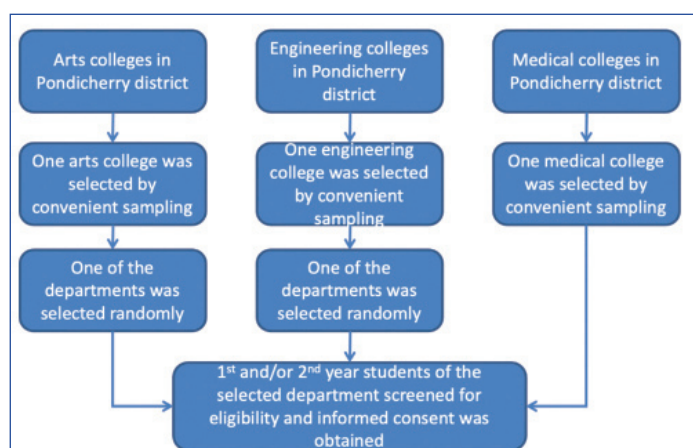
Two studies from India reported that majority of the college students played digital games and health problems such as depressive symptoms and sleep disturbances were found to be associated with digital gaming [6,7].

However, the above mentioned studies were conducted among medical college students only and measured the prevalence of digital gaming and correlation with few health problems such as depression and sleep disturbances. Therefore, this study was conducted to measure the prevalence of digital gaming among adolescents from different types of colleges and to assess its relationship with overall psychological well-being.

MATERIALS AND METHODS

A cross-sectional study was conducted by the Department of Community Medicine, Pondicherry Institute of Medical Sciences, Puducherry, among the medical, engineering and arts and science college going adolescents in Puducherry district of Union territory of Puducherry, South India from July 2018 to August 2018. This study protocol was reviewed and approved by the Institutional Ethics Committee (Ref No: IEC:RC/18/16). The Puducherry district is spread over 11 non-contiguous enclaves lying on the Bay of Bengal within a compact area in the state of Tamil Nadu with a population of 950,289 [8].

Sample size calculation: Based on the prevalence of digital gaming (p) of 56%, absolute error (d) 5.6%, p-value 0.05 and design effect of 1.3 using the formula of $4pq/d^2$, calculated sample size was 410 [9]. Stratified multi-stage sampling technique was used to recruit the study participants [Table/Fig-1].



[Table/Fig-1]: Flowchart showing the multistage stratified sampling method used for selection of study participants.

Colleges in Puducherry district were stratified was based on the type of college, i.e., Arts, Engineering and Medical colleges. From each of these strata, one Medical, one Engineering and one Arts and Science college was selected based on convenient sampling. Permission was obtained from the college authorities to conduct the study among their students. Participant information sheet with all necessary details was provided to all the study participants and written informed consent was obtained before the interview.

Inclusion criteria: From the selected college, one department was randomly selected and all the first and/or second year students in the selected department (age ≤ 19 years) were invited to participate in the study.

Exclusion criteria: Students of age >19 years, students who are not willing to participate.

Study Procedure

After obtaining the written informed consent, a total of 415 eligible study participants were interviewed by a third year MBBS student. He was adequately trained in administering the study questionnaire by a Professor of Community Medicine. The information related to socio-demographic factors and digital gaming was collected using a structured questionnaire consisting of the following variables: age, gender, type of college, digital gaming use, mode, place and frequency of playing digital games, game engagement and addiction. Gaming Addiction Scale (Cronbach's alpha of 0.86) was used to assess the level of addiction to digital gaming [10]. The criteria of engagement were: 1) Saliency (Did you think about playing a game all day long?); 2) Tolerance (Did you spend increasing amounts of time on games?); and 3) Mood modification (Did you play games to forget about real life?). The addiction criteria included the following parameters: 1) Relapse (Have others unsuccessfully tried to reduce your game use?); 2) Withdrawal (Have you felt bad when unable

to play?); 3) Conflict (Did you have fights with family/friends over your time spent on games?); 4) Problems (Have you neglected other activities (e.g., school, work, sports) in order to play games?). The digital gamers were classified as addictive gamers (endorsed all four addiction criteria), problematic gamers (endorsed two or more of the addiction criteria) and engaged gamers (endorsed all three engagement criteria and no more than one addiction criterion) [10]. Ryff's scale (Cronbach's alpha 0.77) was used to assess the psychological well-being of all the participants [11,12]. Permission was obtained from the concerned authors to use Ryff's scale. It consisted of 42 items with six broad dimensions such as autonomy, environmental mastery, personal growth, positive relations with others, purpose in life and self-acceptance. Study participants are asked to rate how strongly they agree or disagree with 42 statements using a 6 point scale (ranging from 1=strongly disagree to 6=strongly agree) and total scores were calculated by summation. The range of scores of each dimension was 7 to 42. For overall scale, 42 and 252 were the minimum and the maximum scores respectively [13]. As per the operational definition used in the present study, the study participants who scored below 25th, 25th to 75th and above 75th percentile were classified as participants with low, moderate and high psychological well-being respectively.

STATISTICAL ANALYSIS

Data were entered in MS Excel and analysed in IBM SPSS Statistics for windows, Version 21.0 (IBM Corp, Armonk, New York). Means and proportions were calculated. Chi-square test was used to measure p-value for comparison of proportions between the groups. For comparing the mean scores among three groups, one-way ANOVA was used to calculate the p-value. The p-value <0.05 was considered as statistically significant.

RESULTS

Relation between socio-demographic characteristics and digital gaming among the study participants are shown in [Table/Fig-2]. Among the study participants of 17 years of age, the proportion of ever played digital gaming was 49.1%. Proportion of study participants who ever played digital gaming among females (93%) was higher than males (74%) and the difference was statistically significant ($p<0.001$). All the students (100%) of arts and engineering colleges ever played digital gaming whereas only 48.9% of medical students ever played digital gaming i.e., both current and past users ($p<0.001$).

Variables	Digital gaming		Total n (%)	p-value [†]
	Ever played (Current+Past) n (%)	Never played n (%)		
Age (years)				
17	26 (49.1)	27 (50.9)	53 (100.0)	<0.001**
18	244 (88.7)	31 (11.3)	275 (100.0)	
19	75 (86.2)	12 (13.8)	87 (100.0)	
Gender				
Male	159 (74.0)	56 (26.0)	215 (100.0)	<0.001**
Female	186 (93.0)	14 (7.0)	200 (100.0)	
Type of college				
Medical	67 (48.9)	70 (51.1)	137 (100.0)	<0.001**
Engineering	155 (100.0)	0 (0.0)	155 (100.0)	
Arts and science	123 (100.0)	0 (0.0)	123 (100.0)	
Total	345 (83.1)	70 (16.9)	415 (100.0)	

[Table/Fig-2]: Relation between socio-demographic characteristics and digital gaming among the study participants (N=415).
[†]p-value calculated using chi-square test, **p<0.001 was considered statistically highly significant

Pattern of digital gaming with respect to gender among those who ever played digital games are presented in [Table/Fig-3]. The proportion of digital gamers using online mode only was slightly higher in males (11.9%) than females (8.1%) but statistically not

significant ($p=0.380$). A 79.2% of males were playing digital games at their homes which was higher than that for females (73.7%) and the difference was statistically significant ($p<0.001$). The proportion of daily playing digital gamers was higher in females (28.6%) than males (23.4%) but not statistically significant ($p=0.215$).

Variables	Male n (%)	Female n (%)	p-value [†]
Mode of gaming			
Online only	19 (11.9)	15 (8.1)	0.380
Offline only	60 (37.7)	66 (35.4)	
Both	80 (50.4)	105 (56.5)	
Total	159 (100)	186 (100)	
Place of gaming			
Home	126 (79.2)	137 (73.7)	<0.001**
Hostel	11 (06.9)	14 (7.5)	
Both	6 (03.8)	28 (15)	
Others	16 (10.1)	7 (3.8)	
Total	159 (100)	186 (100)	
Frequency of gaming (n=291)[†]			
Daily	32 (23.4)	44 (28.6)	0.215
Alternate days	24 (17.5)	35 (22.7)	
Weekly once	41 (29.9)	46 (29.9)	
Monthly once	25 (18.3)	15 (9.7)	
Others	15 (10.9)	14 (9.7)	
Total	137 (100)	154 (100)	

[Table/Fig-3]: Pattern of digital gaming with respect to gender among those who ever played digital games (n=345).

[†]p-value calculated using chi-square test, **p<0.001 was considered statistically highly significant; 54: No response

One-third of the digital gamers played to forget about real life and about one-fourth neglected other activities (e.g., school, work, sports) in order to play games. Out of 345 ever users of digital gaming, the prevalence of addictive and problematic users was 4.3% and 33.6% respectively [Table/Fig-4].

Criterion factors*	Frequency (n)	Percentage (%)
Engagement		
Saliency	64	18.6
Tolerance	91	26.4
Mood modification	119	34.5
Addiction		
Relapse	130	37.7
Withdrawal	100	29
Conflicts	114	33
Problems	80	23.2
Types of users		
Addictive users	15	4.3
Problematic users	116	33.6
Engaged users	17	4.9

[Table/Fig-4]: Prevalence of different types of digital game users based on their level of addiction and the proportion of factors that determine engagement and addiction (n=345).

(frequency corresponds to the participants who answered yes)

*Based on Gaming Addiction Scale [10]

Relationship between digital gaming and psychological well-being is shown in [Table/Fig-5]. The prevalence of low psychological well-being was higher among the never (31.4%) than current (22.5%) and past users (18.2%) of digital gaming and the difference was statistically not significant ($p=0.092$).

[Table/Fig-6] shows the comparison of mean scores of six dimensions of psychological well-being scale among the study participants with respect to digital gaming. The mean score of personal growth

dimension was higher among the current (29.7) and never (29.5) users than past users (26.5) and it was statistically significant ($p<0.001$).

Digital gaming	Frequency (n)	Psychological well-being n (%)			
		Low (<25 th percentile)	Moderate (25-75 th percentile)	High (>75 th percentile)	p-value [†]
Never	70	22 (31.4)	30 (42.9)	18 (25.7)	0.092
Current	142	32 (22.5)	71 (50)	39 (27.5)	
Past	203	37 (18.2)	120 (59.1)	46 (22.7)	

[Table/Fig-5]: Relationship between digital gaming and levels of psychological well-being among the study participants (N=415).

[†]Based on Ryff's psychological well-being scale [11]; [†]Chi-square test was used to calculate the p-value

Dimensions of psychological well-being	Digital gaming			p-value [†]
	Never (n=70) Mean (SD)	Current (n=142) Mean (SD)	Past (n=203) Mean (SD)	
Autonomy	26.8 (4.9)	27.3 (5.6)	27.6 (4.8)	0.546
Positive relations with others	29.1 (6.7)	30.7 (6.0)	30.1 (6.5)	0.223
Environmental mastery	27.9 (5.5)	28.9 (5.2)	27.6 (5.2)	0.071
Personal growth	29.5 (6.1)	29.7 (6.7)	26.5 (6.1)	<0.001**
Purpose in life	28.3 (5.7)	29.2 (5.3)	29.2 (5.4)	0.467
Self-acceptance	27.7 (5.8)	26.9 (5.5)	28.4 (5.4)	0.046*

[Table/Fig-6]: Comparison of mean scores of six dimensions of psychological well-being scale among the study participants with respect to digital gaming (N=415).

[†]p-value calculated using one-way ANOVA test, *p-value <0.05 was considered as statistically significant; **p<0.001

DISCUSSION

In the present study, more than 50% of the study participants were currently playing digital games which were similar to the prevalence of current digital gamers (55.6%) among the medical students of New Delhi, India [7]. The proportion of study participants who never played digital gaming was higher among the males (26%) than females (7%) and this difference was statistically significant. In contrast, the level of internet addiction was higher among males than females in a study which was conducted in the same settings [6]. Every student of Engineering and Arts colleges played digital games in the past or was currently playing however it was only 48.9% among the medical students. The preference to play digital games at homes was slightly higher among males than females and it was statistically significant. In a study conducted by Niranjana R et al., in 2016 from Puducherry, only 6% of the study participants were using internet for digital gaming whereas in the present study, 64.9% were playing online games [6]. This rapid increase in online gaming in the same settings over a shorter period could be explained by increased availability of smart phones and cheaper internet services in the recent years [14].

The proportion of study participants playing digital games using offline mode only was much higher than online only which was in contrast to the findings of a study conducted by David B et al., in Chicago. In their study, the proportion of individuals who played for 21 to 40 hours per week was higher among online (34%) than offline (4%) gamers [15].

In a Norwegian study, the prevalence of addictive and problematic users was 0.6% and 4.1% respectively. In contrast to their findings, addictive and problematic users were higher in the present study which could be attributed to difference in the study participants' age. The present study was conducted among adolescents from 17 to 19 years of age whereas the Norwegian study included participants in the age group of 15 to 40 years [9]. In another study by Mannikko N et al., the prevalence of problematic gaming behaviour was 1.3% based on Internet Gaming Disorder Test (IGDT-10), whereas it was 33.6% in the present study based on Lemmens JS et al., addiction scale [10,16]. However, the prevalence of problematic mobile gaming was 19% among Taiwan school going adolescents using the same

IGDT-10 questionnaire which was relatively lesser than the present study (33%), the variation might be due to different tools and age groups [17]. In a large nation-wide survey conducted among the adolescents in Germany using a Video Game Dependency Scale (KFN-CSAS-II), the prevalence of video game dependency was 1.7%. Males (91%) were predominately affected with video game dependency compared to females [18]. Similarly, the researchers from Netherlands reported that 3% of the adolescents were addicted online gamers based on the duration of weekly online gaming and compulsive internet use [19].

The mean score for personal growth dimension was significantly higher among the current users than the past users ($p < 0.001$) however the mean score of self-acceptance was lower among the current users than the past users ($p = 0.046^*$). Positive association with other dimension's score was highest among current users but statistically not significant. Among Dutch children, Lobel A et al., found that frequent competitive gaming was associated with low prosocial behaviour. However, violent ($r = 0.041$) and co-operative gaming ($r = 0.079$) didn't have correlation with psychosocial changes which was assessed using strengths and difficulties questionnaire [20]. In another study, among 2482 Canadian youth, video game playing and overall screen time were found to be associated with severe symptoms of depression and anxiety [21]. A multicentre collaborative study conducted among the adolescents of United Kingdom (1 site) and United States (2 sites) also supported the above findings that heavy users of digital media including electronic gaming was associated low psychological well-being which includes unhappiness, depression, suicidal ideation and attempts [22]. Similarly, addiction to mobile games was found to be associated with depression and loneliness among school going adolescents in Guizhou Province of China [23]. The findings of these studies indicated that gaming disorders affected the mental health of the young population. The strengths of the present study were utilisation of standard validated questionnaire for assessment of psychological well-being and inclusion of study participants from different types of higher education.

Limitation(s)

Due to significant non-response to variables such as frequency and duration, the dose response gradient was not calculated. The variation in psychological well-being score across different types of digital games users could not be assessed due to lesser sample size of the study. There is a need to conduct similar studies with large sample size using cohort design.

CONCLUSION(S)

The present study findings suggested that most of the college going adolescents had played digital games either previously or were currently playing. There was no significant relationship between psychological well-being and digital gaming except for personal growth and self-acceptance dimensions. Adolescents should be educated about

the harmful effects of digital gaming and its use should be restricted through collaborative efforts of educational institutions, regulatory bodies and government organisations.

REFERENCES

- Adolescents: health risks and solutions. World Health Organization. Available at <http://www.who.int/mediacentre/factsheets/fs345/en/>. Accessed 5 December 2020.
- Griffiths MD, Hunt N. Dependence on Computer Games by Adolescents. *Psychol Rep.* 1998;82(2):475-80.
- Gaming Disorder. ICD-11 Beta Draft (Mortality and Morbidity Statistics). Available at <https://icd.who.int/browse11/l-m/en#/http%253a%252f%252fid.who.int%252fid%252fentify%252f338347362>. Accessed 7 November 2020.
- McLeod JD, Uemura R, Rohman S. Adolescent mental health, behavior problems, and academic achievement. *J Health Soc Behav.* 2012;53(4):482-97.
- Mukhra R, Baryah N, Krishan K, Kanchan T. "Blue Whale Challenge": A game or crime? *Sci Eng Ethics.* 2019;25(1):285-91.
- Niranjan R, Anandraj R, Prasad T, Manikandan S. Prevalence of internet addiction and effects of social media usage among a private medical college students, Pondicherry. *International Journal of Current Advanced Research.* 2017;06(10):6486-90.
- Singh S, Dahiya N, Singh AB, Kumar R, Balhara YP. Gaming disorder among medical college students from India: Exploring the pattern and correlates. *Ind Psychiatry J.* 2019;28(1):107-14.
- Census of Indian districts 2011. Available at <https://www.census2011.co.in/district.php>. Accessed 9 April 2021.
- Mentzoni RA, Brunborg GS, Molde H, Myrseth H, Skouvrøe KJM, Hetland J, et al. Problematic Video Game Use: Estimated Prevalence and Associations with Mental and Physical Health. *Cyberpsychol Behav Soc Netw.* 2011;14(10):591-96.
- Lemmens JS, Valkenburg PM, Peter J. Development and validation of a game addiction scale for adolescents. *Media Psychology.* 2009;12(1):77-95.
- Ryff CD. Psychological well-being revisited: Advances in the science and practice of Eudaimonia. *Psychother Psychosom.* 2014;83(1):10-28.
- Shryock S, Meeks S. Internal consistency and factorial validity of the 42-item psychological well-being scales. *Innovation in Aging.* 2018;2(1):690-91.
- Abbott RA, Ploubidis GB, Huppert FA, Kuh D, Croudace TJ. An evaluation of the precision of measurement of Ryff's Psychological well-being scales in a population sample. *Soc Indic Res.* 2010;97(3):357-73.
- Number of smartphone users in India in 2015 to 2020 with a forecast until 2025. Technology and Telecommunications. Available at <https://www.statista.com/statistics/467163/forecast-of-smartphone-users-in-india/>. Accessed 9 April 2021.
- David B, Wiemer-Hastings P. Addiction to the internet and online gaming. *Cyberpsychol Behav.* 2005;8(2):110-13.
- Mannikko N, Ruotsalainen H, Tolvanen A, Kaariainen M. Psychometric properties of the internet gaming disorder test (IGDT-10) and problematic gaming behavior among Finnish vocational school students. *Scand J Psychol.* 2019;60(3):252-60.
- Pan YC, Chiu YC, Lin YH. Development of the problematic mobile gaming questionnaire and prevalence of mobile gaming addiction among adolescents in Taiwan. *Cyberpsychol Behav Soc Netw.* 2019;22(10):662-69.
- Rehbein F, Kleimann M, Mössle T. Prevalence and risk factors of video game dependency in adolescence: Results of a German nationwide survey. *Cyberpsychol Behav Soc Netw.* 2010;13(3):269-77.
- Van Rooij AJ, Schoenmakers TM, Vermulst AA, Van den Eijnden RJ, Van de Mheen D. Online video game addiction: Identification of addicted adolescent gamers. *Addiction.* 2011;106(1):205-12.
- Lobel A, Engels R, Stone LL, Burk WJ, Granic I. Video gaming and children's psychosocial well-being: A longitudinal study. *J Youth Adolescence.* 2017;46(4):884-97.
- Maras D, Flament MF, Murray M, Buchholz A, Henderson KA, Obeid N, et al. Screen time is associated with depression and anxiety in Canadian youth. *Prev Med.* 2015;73(1):133-38.
- Twenge JM, Campbell WK. Media use is linked to lower psychological well-being: evidence from three datasets. *Psychiatr Q.* 2019;90(2):311-31.
- Wang JL, Sheng JR, Wang HZ. The association between mobile game addiction and depression, social anxiety, and loneliness. *Front. Public Health.* 2019;7(9):247.

PARTICULARS OF CONTRIBUTORS:

- Final MBBS Student, Department of Community Medicine, Pondicherry Institute of Medical Sciences, Puducherry, India.
- Professor, Department of Community Medicine, Pondicherry Institute of Medical Sciences, Puducherry, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. P Stalin,
Department of Community Medicine, Pondicherry Institute of Medical Sciences,
Kalapet, Puducherry-605014, India.
E-mail: stalinprabakaran83@gmail.com

AUTHOR DECLARATION:

- Financial or Other Competing Interests: Funded by ICMR under Short Term Studentship. [Ref. ID: 2018-00885].
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

PLAGIARISM CHECKING METHODS: [Jan H et al.]

- Plagiarism X-checker: Jan 28, 2021
- Manual Googling: Apr 26, 2021
- iThenticate Software: May 25, 2021 (12%)

ETYMOLOGY: Author Origin

Date of Submission: **Jan 27, 2021**
Date of Peer Review: **Mar 17, 2021**
Date of Acceptance: **May 11, 2021**
Date of Publishing: **Jun 01, 2021**