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Internet Addiction: Influencing Academic, Non-academic, and Psychological Aspects in Offshore Malaysian Medical Students

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ABSTRACT

Excessive internet usage creates abundant problems like dependency and addictive behaviour. Internet addiction (IA) is becoming a universal public health concern. The isolated group of Malaysian students studying in offshore campuses in India is more susceptible to IA due to language, culture, ethnicity, and food habit differences, leading to a lack of communication with native students. The study aims to determine the prevalence of IA and its influence on academic, non-academic, and psychological aspects in Malaysian medical students. A cross-sectional study was conducted on 170 offshore Malaysian medical students using Young's Internet Addiction Test (Y-IAT) questionnaire of 20 items. The difference was tested by Student's t-test and the association between IA and other factors by chi-square test with a statistical significance at 5%. The study observed a 46% prevalence of IA in offshore Malaysian medical students. Male students were more prone to IA compared to females. The amount of time spent on

entertainment per day was significantly ($p=0.004$) associated with IA. The present study revealed that the prevalence of IA was significantly associated with academic performance ($\chi^2= 33.670$ $p=0.001$) and psychological disturbances like sleep disturbance due to late-night log-ins ($\chi^2= 41.013$, $p=0.001$), felt life would always be joyless ($\chi^2= 27.272$, $p=0.001$) and, depressed moody without internet ($\chi^2= 33.347$, $p=0.001$). The present study revealed that IA has an adverse impact on students' academic activities as well as on psychological health. Medical teachers and schools should identify students who are prone to and affected by IA and recommend interventions based on their needs. We recommend that students utilise their valuable time in offline activities like regular sports, cultural exchange programs, fun activities, yoga, meditation, and learning new skills and languages. These activities may help students prevent overindulgence with the internet, encourage the overall growth of promising doctors, and build a healthy society.

Keywords: Internet addiction, Young's internet addiction test, Malaysian medical students, Offshore campus, Psychological effects, Academic activities, Non-academic activities

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INTRODUCTION

Over the last two decades, internet usage has grown exponentially worldwide, including in developing nations. According to Internet World Stats; Usage & Population Statistics 2023 estimation, the internet has penetrated 68% of the 7.93 billion world population. Asian population contributes more than half (55%) of the world population and has 54% of users with a 67% internet penetration rate. From 2000 to 2022, internet usage has grown to 1392 % worldwide, while 2452% growth is seen in Asia. India contributes 28%, while Malaysia only accounts for 1.1% of the total population of Asia. The internet penetration rate in India is 60%, and in Malaysia, it is 94%, which is remarkably much higher (1).

After the COVID era, the internet has developed into an indispensable source for learning, communication, business, and entertainment worldwide, connecting people without delay. It has become a two-edged sword, as it helps to acquire and update knowledge, on the other hand, its uncontrolled, undisciplined use promotes addiction. Young (1998) considered internet addiction (IA) as a new emerging clinical disorder that has shown similarities with alcohol and drug addictions (2, 3). Currently, IA is turning into a universal public health concern. IA is also known as problematic or pathological internet use and is included in the Diagnostic & Statistical Manual of Mental Disorders DSM-V by the American Psychiatric Association (3, 4).

A meta-analysis report confirms that IA is increasing in young adults and the new generation (or digital natives) with implications such as increased individualism, lower sociability, and enculturation (5). Gender, online chatting, decreased interaction with parents/friends, staying at the hostel, time and money spent on the internet (6), intensive surfing (7), spending more time on entertainment, increased frequency of internet usage (8), lack of physical activities (9) are potential risk factors of IA.

Excessive internet usage has led to various physical, mental, social, and behavioural problems, negatively affecting quality of life (2, 10-11). Studies conducted on university students disclosed that IA has led to psychological distress like anxiety, depression, stress, poor mental health (10, 12), social adjustment (13), and sleep disturbance (14). IA had a negative impact on their academic performance (15, 16) and psychological health (12, 17 & 18). Even evidence from neuroimaging confirms that IA has shown neuroanatomical and neurocognitive changes in brain regions (19, 20).

According to a meta-analysis (21), the pooled prevalence of IA among medical students from different countries is 30%. It is approximately five times higher than in the general population. Studies conducted on medical students with IA on Malaysian campuses reported a prevalence of 37% in Ching et al. (8), 50% of possibly addicts, 6.7% addicted in Ansari et al. (12), and 56% of problematic users, 7.8% of severe addicts in Rosliza et al. (15). A similar prevalence rate of 36% and 57% was also noted in medical students in India (16, 22). These studies have emphasised the need to address the problem through proper intervention. However, these studies lack focus on medical students studied on offshore campuses.

Many Malaysian students study at Indian medical universities that are well-equipped and provide free Wi-Fi to students. Due to communication barriers caused by language, culture, ethnicity, and food habits, this group of students tends to feel lonely on the Indian campus, which makes them more vulnerable to developing IA rather unknowingly. There is a dearth of literature on IA-prone medical students studying on offshore campuses. Hence, we considered investigating the prevalence of IA and whether it affects the academic, non-academic, and psychological aspects of medical students studying on offshore campuses in India. This will help the academicians to suggest and provide appropriate interventions to the IA-affected students as per their needs. The study aims to determine the prevalence of IA and its influence on academic, non-academic, and psychological aspects in Malaysian medical students.

MATERIALS AND METHODS

This cross-sectional study was conducted from March to October 2019 on Malaysian medical students studying at the International Medical Programme (IMP), Belgaum, Karnataka, India. A pilot study was conducted by taking a convenient sample of 30 students, and the prevalence of IA was 31.8%. Based on this, the sample size was estimated as 170 using the formula $n = Z^2 pq / d^2$ with 95% confidence and 7% margin of error. The nature of the study was explained to the students clearly, and consent was obtained from those who wished to participate. An institutional ethical committee, USM-KLE IMP Belgaum, approved the study. Confidentiality was maintained during the entire process of this study.

The study population included 170 students with an average age of 22 years, consisting of 1/3rd male and 2/3rd female students. Demographic data such as age, gender, parents' working status, hometown, and activities used with and without the internet were obtained by a self-administered questionnaire. IA was tested using Young's Internet Addiction Test (Y-IAT) questionnaire, which is one of the most accepted, validated, and reliable tools for the evaluation of internet addiction with an overall Cronbach's alpha coefficient of 0.889 (95%CI 0.884-0.895) (23). The Y-IAT consists of 20 items, measured on a 5-point Likert scale from 1=rarely, 2=occasionally, 3=frequently, 4=often, and 5=always. Its questions cover how their internet use affects their daily personal life, social life, productivity, academic performance, and emotional feelings among study participants. The score ranges from 20 to 100, and a higher score signifies internet addiction. Based on the analysis of Y-IAT with 20 items using all 170 samples, a mean Y-IAT score of 45 was calculated and taken as a cut-off point (8). Accordingly, students who scored less than 45 were categorised as students without IA, while those with more or equal to 45 were classified as students with IA. Severity can be rated as mild, moderate, and severe. A score of 20-39 points is a mild online user with control over their activities. A 40-69 and 70-100 score means the internet is causing problems, and students are considered moderate and severe internet addicts, respectively (23, 24). We further analysed individual Y-IAT item numbers 6, 8, 12, 14 and 20 to understand the effects of IA on academic and psychological aspects.

Statistical analysis was performed by using SPSS version 20. Mean and standard deviation were used for continuous data and percentages for categorical data. The students' t-test was applied to see the difference between the groups. The chi-square test was used to establish the associations between academic, non-academic, and psychological factors and the prevalence of IA as an outcome. A statistical significance was set at a 5% level ($p < 0.05$).

RESULTS

Table 1 shows the prevalence of internet addiction based on students' demography and non-academic activities. Based on the cut-off point of the Y-IAT score, 46% (78 out of 170) of students have been addicted to the internet. Further study has noticed that out of 46% (78) students with IA, 42% (71) had a score of 45-69 and were considered moderate internet addicts, and 4% (7) who had a score over 70 were considered severe internet addicts. The difference in the mean Y-IAT score of students with and without IA was statistically significant ($p = 0.001$).

The study population consisted of 1/3rd male and 2/3rd female students, with an average age of 22 years. About 40% of female and 57% of male students were internet addicts, and the difference was statistically significant ($p=0.039$). Male students are more prone to IA than female students. The parents' working status and hometown (urban/rural) of the students did not show any effect on IA.

Most students in both groups accessed the internet for academic and non-academic purposes. Further, we analysed which non-academic activities (Table 1) students do with and without the internet. More students without IA spend 60 to 90 minutes daily interacting with their parents online compared to students with IA, and the association was statistically significant ($p=0.031$). The amount of time spent on entertainment per day was higher in students with IA, and the association was statistically significant ($p=0.004$). Similarly, statistically significant associations were observed between using mobile devices while walking ($p=0.001$) and eating ($p=0.001$) with the prevalence of IA. The study observed that in gaming and social media, the number of students with IA increased along with the amount of time consumed compared to students without IA, but did not find statistically significant associations. The study did not observe any significant correlation between the prevalence of IA with physical activities and hobbies. Interestingly, we noticed that regarding physical activities and hobbies, the percentage of students increased from 0 to 60 minutes in students without IA, whereas it decreased in students with IA.

Table 1: Prevalence of internet addiction based on students' demography and non-academic activities

Variables		Without internet addiction n=92(%)	With internet addiction n=78(%)	Total n=170(%)	Chi-square value	p-value
Mean Y-IAT score±SD		35.75±5.24	54.95±8.81	45±11.92	-17.57#	0.001*
Age in years±SD		22.03±1.79	21.62±1.58	21.84±1.71	1.595#	0.113
Gender	Male	24(43%)	32(57%)	56(100%)	4.264	0.039*
	Female	68(60%)	46(40%)	114(100%)		

Parents' working status	Single	43(52%)	40(48%)	83(100%)	0.349	0.555
	Both	49(56%)	38(44%)	87(100%)		
Hometown	Urban	75(56%)	58(44%)	133(100%)	1.272	0.259
	Rural	17(46%)	20(54%)	37(100%)		
Online interaction with parents per day	None	11(44%)	14(56%)	25(100%)	10.642	0.031*
	<30mins	45(48%)	49(52%)	94(100%)		
	<60mins	26(70%)	11(30%)	37(100%)		
	<90mins	5(56%)	4(44%)	9(100%)		
	>2hrs	5(100%)	0(0%)	5(100%)		
Entertainment, minutes per day	None	10(71%)	4(29%)	14(100%)	15.424	0.004*
	<30mins	25(51%)	24(49%)	49(100%)		
	<60mins	32(71%)	13(29%)	45(100%)		
	<90mins	17(52%)	16(48%)	33(100%)		
	>2hrs	8(28%)	21(72%)	29(100%)		
Gaming, minutes per day	None	60(58%)	44(42%)	104(100%)	4.882	0.300
	<30mins	13(52%)	12(48%)	25(100%)		
	<60mins	13(59%)	9(40%)	22(100%)		
	<90mins	3(37.5%)	5(62.5%)	8(100%)		
	>2hrs	3(27%)	8(73%)	11(100%)		
Social media, minutes per day	None	2(50%)	2 (50%)	4(100%)	9.075	0.059
	<30mins	15(65%)	8(35%)	23(100%)		
	<60mins	30(68%)	14(31%)	44(100%)		
	<90mins	22(52%)	20(47%)	42(100%)		
	>2hrs	23(40%)	34(60%)	57(100%)		
Mobile while walking	Nil	13(93%)	1(7%)	14(100%)	30.604	0.001*
	Occasionally	58(65%)	31(35%)	89(100%)		
	Frequently	15(42%)	21(58%)	36(100%)		
	Often	3(15%)	17(85%)	20(100%)		
	Always	3(27%)	8(73%)	11(100%)		
Mobile while	No	23(79%)	6(21%)	29(100%)	22.414	0.001*

eating	Occasionally	45(62%)	28(38%)	73(100%)		
	Frequently	13(46%)	15(54%)	28(100%)		
	Often	10(32%)	21(68%)	31(100%)		
	Always	1(11%)	8(89%)	9(100%)		
Physical activities, minutes per day	nil	5(31%)	11(69%)	16(100%)	6.396	0.094
	<30mins	41(60%)	27(40%)	68(100%)		
	60mins	23(62%)	14(38%)	37(100%)		
	90mins	23(47%)	26(53%)	49(100%)		
Hobbies, minutes per day	nil	4(36%)	7(64%)	11(100%)	7.412	0.116
	<30mins	13(45%)	16(55%)	29(100%)		
	60mins	34(69%)	15(31%)	49(100%)		
	90mins	14(50%)	14(50%)	28(100%)		
	120mins	27(51%)	26(49%)	53(100%)		
Notes: Y-IAT =Young's Internet addiction test; #=t test; *= p-value significant <0.05.						

Table 2 shows the association between the prevalence of IA and academic activities. Students use the internet for academic activities, such as watching videos, browsing, reading PowerPoint presentations, and reading e-books. About 76% of students used the internet for all modes; no difference was noticed. Regarding time spent on the net daily, out of 99, 57% of students with IA spend more than 4 hours compared to 43% of students without IA. The association between time spent on net per day and the prevalence of IA was statistically significant ($p=0.002$), and a similar result was observed with net consumption ($p=0.033$).

Table 2: Association between prevalence of Internet addiction and academic activities of students

Variables	Grades	Without internet addiction n=92(%)	With internet addiction n=78(%)	Total n=170(%)	chi-square value	p-value
Purpose of Internet access	Academics	1(100%)	0 (0 %)	1(100%)	0.973	0.615
	Non academics	9(50%)	9 (50%)	18 (100%)		
	Both	82(54%)	69 (46 %)	151(100%)		
Mode of Internet access for academic purpose	Watching videos	5 (71 %)	2 (29 %)	7 (100%)	6.441	0.169
	Browsing	3 (43 %)	4 (5 7%)	7(100%)		

	Reading power point	10(67%)	5 (33 %)	15 (100%)		
	Reading e books	9 (82 %)	2 (18 %)	11 (100%)		
	All	65 (50%)	65 (50 %)	130 (100%)		
Time spent on net/day	Nil	0(0%)	0(0%)	0(100%)	15.164	0.002*
	<1hr	6(75%)	2(25%)	8(100%)		
	2hrs	21(84%)	4(16%)	25(100%)		
	3hrs	22(58%)	16(42%)	38(100%)		
	>4hrs	43(43%)	56(57%)	99(100%)		
Net consumption per day	<1gb	11(65%)	6(35%)	17(100%)	10.491	0.033*
	1gb	31(65%)	17(35%)	48(100%)		
	2gb	39(51%)	37(49%)	76(100%)		
	3gb	7(29%)	17(71%)	24(100%)		
	>4gb	4(80%)	1(20%)	5(100%)		
Y- IAT Item no. 6: How often do your college work/ grades suffers because of amount of time you spend online?	Rarely	60(73%)	22(27%)	82(100%)	38.628	0.001*
	Occasionally	25(51%)	24(49%)	49(100%)		
	Frequently	7(39%)	11(61%)	18(100%)		
	Often	0(0%)	15(100%)	15(100%)		
	Always	0(0%)	6(100%)	6(100%)		
Y-IAT Item no. 8: How often does your academic performance suffers because of internet?	Rarely	42(78%)	12(22%)	54(100%)	33.670	0.001*
	Occasionally	35(57%)	26(43%)	61(100%)		
	Frequently	12(40%)	18(60%)	30(100%)		
	Often	3(20%)	12(80%)	15(100%)		
	Always	0(0%)	10(100%)	10(100%)		
Missed classes because of late night Internet use	Rarely	90 (57%)	67 (43 %)	157 (100%)	08.505	0.004*
	Occasionally	2 (15 %)	11 (85 %)	13 (100%)		
	Frequently	0 (0 %)	0 (0 %)	0 (100%)		
	Often	0 (0 %)	0 (0 %)	0 (100%)		

	Always	0 (0 %)	0 (0%)	0 (100%)		
Notes:*= p-value significant <0.05.						

Regarding Y-IAT item number 6, most students with IA responded about college work. They often described their college work suffering because of the amount of time spent online, and its association with the prevalence of IA was found to be statistically significant (p=0.001). Similarly, significant associations were observed between (Y-IAT item no. 8) academic performance affected by internet usage (p=0.001) and missed classes because of late-night internet use (p=0.004) with the prevalence of IA.

Bar graphs show the association between the prevalence of IA and the psychological health of students. Item no. 12 in Y-IAT revealed that 76% of students with IA always felt that life would be joyless or boring without the internet compared to 24% of students without IA, presented in bar graph 1. The association between Y-IAT item no. 12 and the prevalence of IA was statistically significant ($\chi^2= 27.272$ & p=0.001). Similarly, statistically significant associations were observed between (Y-IAT item no. 14) sleep disturbance due to late-night log-ins ($\chi^2= 41.013$, p=0.001) with the prevalence of IA presented in bar graph 2. A greater number of students with IA felt depressed, moody, or nervous without the internet (Y-IAT item no. 20) than students without IA, which is presented in bar graph 3. This association was statistically significant ($\chi^2= 33.347$, p=0.001) hence, more students with IA showed dependency on the internet.

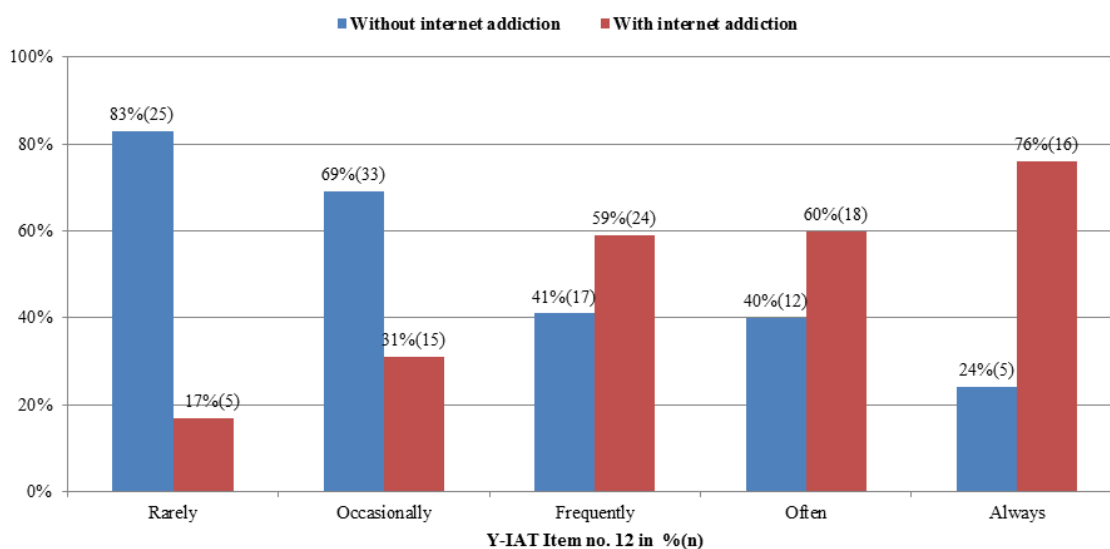


Figure 1: Between 2 groups showing item no. 12 of Young’s IAT: How often do you fear that life without internet would be boring, empty and joyless?

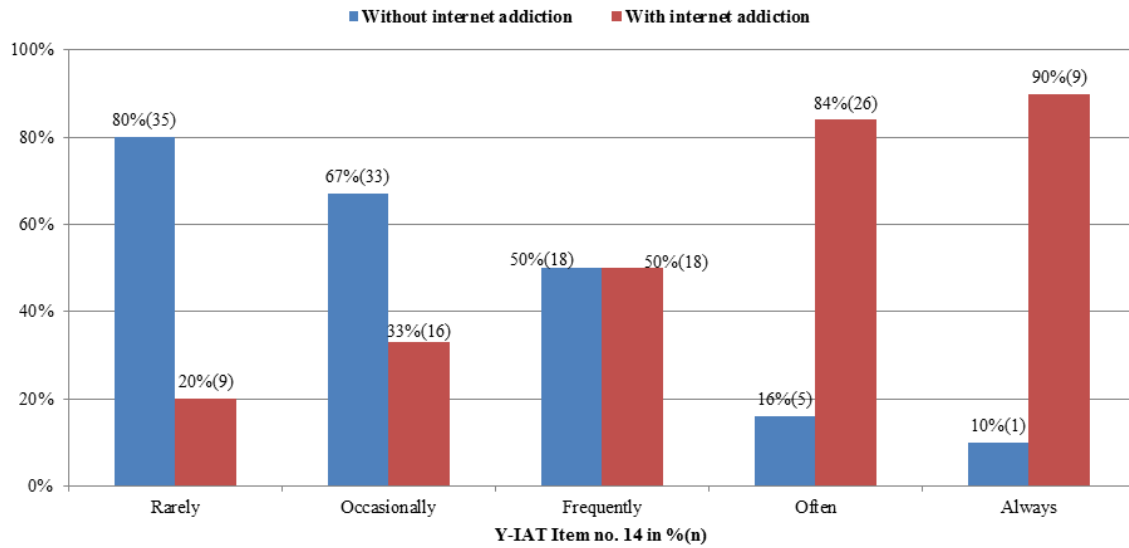


Figure 2: Between 2 groups showing item no. 14 of Young's IAT: How often do you lose sleep due to late-night logins?

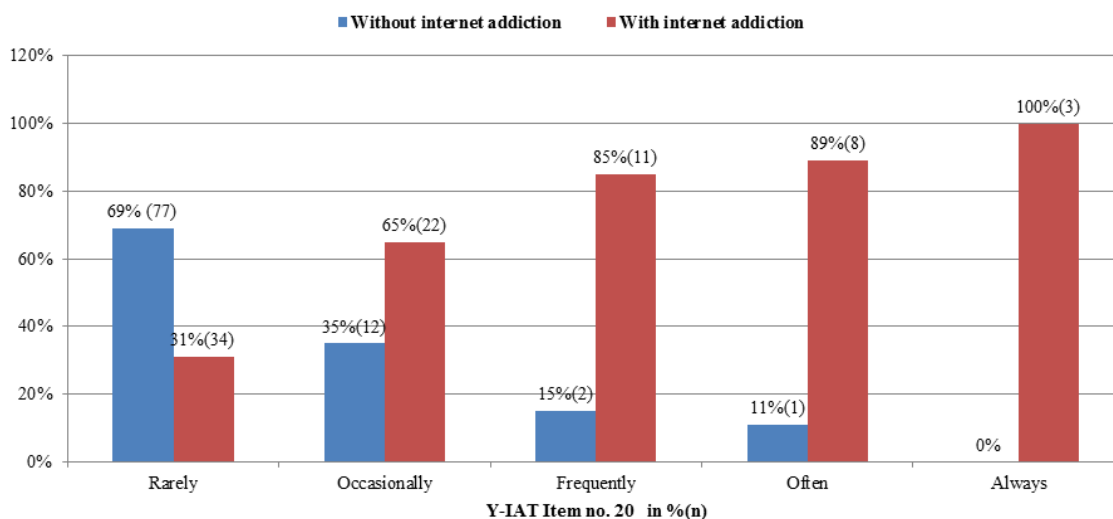


Figure 3: Between 2 groups showing item no. 20 of Young's IAT: How often do you feel depressed & moody when you are offline, which goes away once you are back online?

DISCUSSION

The technological revolution has resulted in an exponential rise in internet usage recently, which benefits society but also creates abundant problems like dependency and addictive behaviour, especially in youngsters. A meta-analysis estimated the pooled prevalence of IA to be 30% among medical students in different countries, approximately five times more than the general population (21). Various studies carried out on IA using Y-IAT at Malaysian medical campuses on Malaysian students showed a prevalence of 37% in Ching et al. (8), 50% possibly addicted, 6.7% addicted in Ansari et al. (12), and 56% problematic users, 7.8% severe addicts in Rosliza et al. (15). However, these studies have lacked focus on medical students studied on offshore campuses. Thus, the present study has filled this gap and found a 46% prevalence of IA in Malaysian medical students studying on offshore campus. The prevalence rate in different studies ranged from 37-56%. Even though all studies used Y-IAT for testing IA, this difference may be due to variations in grouping structure based on Y-IAT scores (8, 12 & 15) and different settings (environment) of the students in the present study.

A study conducted on-campus at Medical School in Malaysia during pre-COVID time revealed the prevalence of IA in different ethnic groups of medical students (12). It showed that the highest prevalence of IA (including possibly addicted and addicted) was recorded in other ethnic student groups (67%), followed by local Malaya (63%), Chinese (45%), and Indian (32%) students. Similar findings were also noted in another study conducted on the Malaysian Health Campus (8). These studies have shown that different ethnicities and cultures from those of native students affect the prevalence of IA. It is worth noting that the present study data was collected just before the COVID-19 pandemic hit India in December 2019. We assume that the prevalence of IA might increase after the COVID period since the internet has become an inevitable source for most teaching and learning activities. And now it has become the new norm.

Free Wi-Fi on medical campuses and easy access to various Internet of Things (IoT) devices allow medical students to utilise the internet for surfing, communication, entertainment, education, and other activities (6-8). Male gender, increased frequency of internet usage (8), using the smartphone for social communication, visiting new sites (7, 25), spending more money on the internet, staying online for a longer time, online chatting, decreased interaction with parents (6), and lack of physical activities (9) are determinants of IA. Students who use the internet for entertainment are 3.5 times more likely to get IA (8). Students who stay away from home are more susceptible to IA because of privacy, and the absence of parental supervision exacerbates the situation (6). The present study confirms that students who spend more time interacting online with their parents are prevented from the adverse effects of the internet. The current study also noted similar factors like male gender and entertainment are associated with the increased prevalence of IA. We observed that students with IA used mobile even while eating and walking, and showed behavioural changes such as dependency.

Medical students commonly use the internet for educational purposes after social networking and entertainment (7, 15). Medical students who used the internet more frequently and stayed online longer were significantly correlated with IA (8, 15). This affects their sleep (14), increasing their chances of missing classes and adversely affecting their academic performance (10, 15-16). The current study revealed that spending more time and data on the internet and late-night logins led to sleep disturbances, missed classes, and ultimately affected their academic performance, corroborating the above studies. In the present study, we observed that most students were more dependent on the internet and gadgets for most of their academic activities in the classroom than textbooks, pens, and paper.

Block (26) mentioned features of IA, mainly dependency, excessive use with loss of time sense, feelings of anxiety, tension in non-availability of the internet, poor achievement, social isolation, and neglecting basic urges. The research involved medical students with IA established a positive relationship with depression, anxiety, stress symptoms, and an inverse association with social interaction (12-13, 17-18 & 27). The present study revealed that psychological disturbances such as sleep disturbances due to late-night logins, feeling life would always be joyless, and depression without the internet were significantly experienced by students with IA than without IA.

Alarming evidence from neuroimaging studies (19, 20) showed that IA also had an impact, even on the neurobiological level. A study (19) revealed that functional impairment in the reward (striatum, insula, amygdala) and executive (frontal/parietal/occipital lobes of brain) systems was seen in young adults with IA. Another neuroimaging study (20) showed that internet addicts struggle to shift their attention from distracting stimuli. This was because of lower activation levels in the frontopolar (FPC) cortex in people with IA.

As the global prevalence of IA grows, its effect is alarming on overall health, particularly for medical students, and indirectly, the community's wellness. Researchers have advised interventions to prevent IA (10, 17-18 & 21). Cognitive behavioural therapy (CBT) is one of the psychological interventions suggested as a comprehensive and effective treatment in IA. CBT involves identifying causes and challenges in setting goals and modifying cognitive distortions that induce and promote addictive behaviour (28). Other complementary therapies, like traditional yoga practices, including posture, mindful breathing, and meditation, are beneficial in treating and preventing addictive behaviour (29-31).

As a part of the psychiatry postings for Phase II, year 4 Malaysian medical students in the International Medical Programme Belagavi, India campus, the school offers counselling and Jacobson's progressive muscle relaxation (JPMR) sessions. Along with these, Indian traditional breathing techniques like alternate nostril breathing (anulom vilom pranayama), fast breathing (kapalbathi), and open-eye meditation are taught by the author 4. This helps to develop the mental and

psychological endurance of the students. After the sessions, students had lower anxiety levels, and it was observed on the Galvanic Skin Response biofeedback machine.

Today, the Internet is an inevitable source for teaching and learning. It has established its role well in the present scenario, and undeniably, its use will expand in the future. The real challenge is to prevent IA by conducting awareness programs on responsible use of the internet and creating support groups to assist students in overcoming the problem in the initial stage. We recommend that students utilise their valuable time in offline activities like regular sports, cultural exchange programs, fun activities, yoga, meditation, and learning new skills and languages. These activities may help students prevent overindulgence with the internet, encourage the overall growth of promising doctors, and build a healthy society.

To the best of our knowledge, the present study is the first to assess the prevalence of IA among offshore medical students. The study also further investigated the influence of IA on academic, non-academic, and psychological aspects. The study's limitation is that it is conducted in a single centre. A multicentric study is highly recommended to generalise the results to the population. Since a study is based on a questionnaire, responses are subjective.

CONCLUSION

The present study investigated the prevalence of IA and its effect on academic, non-academic, and psychological aspects in offshore Malaysian medical students. Medical students access the internet for educational, personal, and social needs. Malaysian medical students are an isolated group studying away from home in India. Their ethnicity, language, culture, and food habits differ from native students, leading to a lack of communication. Because of these risk factors, they have a higher chance of developing IA.

Other factors noted with IA in the present study are utilising more data and spending more time on the internet for entertainment purposes, late-night logins made them miss classes and suffer from college work, ultimately affecting their academic performances. Psychological disturbances like sleep disturbances due to late-night logins, feeling like life would be joyless, and depression without the internet are significantly associated with IA. IA has an adverse impact on pupils' academic activities as well as psychological health. The overall health of medical students is essential in quality learning and becoming competent physicians to serve the community. Medical teachers and schools should identify students who are prone to and affected by IA and recommend interventions (CBT programs) based on their needs.

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