Does Circadian Preference Determine Risk for Developing Alcohol Use Disorder amongst Undergraduate and Pre-University Students? A Cross-Sectional Study

Chong Kar Hon[1*], Tan Yee Hau[1], Thong Tze Ying[1], Ganesh Kumar A/L Vasantha Kumar[1] and Dina Kumaran[1]

[1]Faculty of Medicine, Melaka Manipal Medical College, Melaka, Malaysia.

Authors' contributions

This work was carried out in collaboration between all authors. Authors CKH and TYH contributed to the concept and designed the study. Authors CKH, TYH, TTY, GKVK and DK managed the literature searches and participated in acquisition of data analysis and interpretation of data. Author CKH wrote the first draft of the manuscript and revised it critically. All authors read and approved the final manuscript.

Article Information

Original Research Article

ABSTRACT

Aims: To determine the relationship between circadian preference and risk for developing alcohol use disorder among medical students and pre-university students.
Study Design: An analytical cross sectional study was conducted among non-Muslim

_____

*Corresponding author: E-mail: c.karhonboy@gmail.com;

undergraduate students of a private medical institution in Melaka, Malaysia.

Place and Duration of Study: Melaka, Malaysia from September to October 2014.

Methodology: 250 participants were selected by using multistage sampling method, 223 students participated (89.2% resposnse rate). Sociodemographical data, assessment of circadian preference by International Journal Chronobiology (IJC) and WHO Alcohol Use Disorder Identification Test were collected using a structured questionnaire. Bivariate analysis, chi-square test, Fisher Exact test and multiple logistic regression analysis were calculated.

Results: Out of 223 non-Muslim undergraduate students, 60.09% were having intermediate type, 21.97% were having evening type and 17.94% were having morning type of circadian preference. Only 17.04% of the participants were having moderate, high and addictive alcohol consumption risk; among them 7.9% were addictive and 10.5% were high risk. Participants with evening type of circadian preference were 4.5 times more likely to be associated with a higher risk for developing alcohol use disorder as compared to participants with morning type of circadian preference (OR 4.5, 95% CI 1.2-17.0, P=0.02). After adjusted for age, gender, ethnicity, hostel and monthly allowance, evening type of circadian preference and risk for developing alcohol use disorder were not significantly associated to each other.

Conclusion: Circadian preference was significantly associated to the risk for developing alcohol use disorder among the undergraduate and pre-university students in bi-variate analysis without considering other factors such as age, gender, ethnicity and monthly allowance. However, no significant association were found among each of the factors that were being compared. This was because there was a confounding variable which was gender affecting the result. In our study, male students had a higher risk in developing AUD and male students were more likely to have evening type of cicadian preference. We should provide adequate counseling about sleep hygiene, healthy sleep-wake cycle and encourage students to develop morning type of circadian preference in order to reduce the risk of developing alcohol use disorder.

1. INTRODUCTION

Circadian preference is referred to the morningness, intermediate and eveningness of an individual who has different alertness, activities and sleep wake cycle in the morning and evening. A morning type person wakes up early, is able to perform physical activities more easily in the morning, is more mentally alert early in the day and goes to bed early in the evening. Individuals who described as an evening type person wakes up late in the morning, sleep late at night, having physical activities and mental alertness best performed in the evening [1].

According to WHO global status report on alcohol and health 2014, harmful use of alcohol caused 3.3 million deaths in 2012, caused injury and illness to millions more, and increasingly affected the younger generation in developing countries. 5.9% of all global deaths were related to alcohol [2]. In other country such as US, a cohort study showed that 78% of US medical student having alcohol in previous month and 44% of them drink excessively [3]. 89% out of 3075 UK university second year students were drinkers. Among the drinkers 15% of them were hazardous drinkers and 28% of them were binge alcohol consumers [4]. A study also shows that 45% of the UK first year medical students exceeded the recommended UK limits for alcohol consumption [5].

In Malaysia, according to World Health Organization Report in year 2014 (Global Status Report on Alcohol and Health: Individual Country Profile, Malaysia), 12.7% of Malaysian consumed alcohol [6]. Prevalence of heavy episode alcohol consumption in Malaysia in year 2010 was 2.5% and prevalence of alcohol use disorder (AUD) among both sexes in Malaysia in year 2010 was 2.4% [6].

In a study done in 2011, individual with morning type of circadian preference was significantly associated with lower chance of having health-impairing behaviours such as daily smoking (*p* < .0001) and alcohol use (*p* < .0001). Therefore, the circadian preference of eveningness type was associated more with health impairing behaviour like smoking and alcohol use

compared to morningness and intermediate group [1]. A few studies had been done and they stated that the personality and psychosocial activities of an individual such as alcohol use were associated with the individual's circadian preference [7,8]. Moreover, a study on circadian gene polymorphism in alcohol use disorder and alcohol consumption reported that there was an association between *ARNTL* (a transcriptional complex), *ADCYAP1* (a neurotransmitter of the retinohypothalamic tract) and *VIP* (participates in maintaining oscillations within and sending signals from the SCN) with alcohol consumption, *DRD2* with alcohol sensitivity and *ARNTL2* with alcohol abuse [9].

To the best of our knowledge, no similar research was conducted to study the relationship between circadian preference and risk for developing alcohol use disorder in Malaysia. Thus, this study was carried out to know how circadian preferences affect the risk for developing alcohol use disorder among undergraduate medical students and pre-university students.

2. MATERIALS AND METHODS

This analytical cross sectional study was conducted to find out the association between circadian preference and risk for developing alcohol use disorder among undergraduate medical students of a private medical college in Melaka, Malaysia from September 2014 to October 2014.

Our sample size was calculated using formula to estimate single population proportion with prevalence of 12.7% Malaysian who consumed alcohol according to WHO's global status report in Malaysia 2014 [6]. 95% confidence interval, 5% precision and minimum number of 171 students was required.

$$n = \frac{z^2_{1-\alpha/2} \times p \, (1-p)}{d^2}$$

$$n = \frac{1.96^2 \times 0.127 \, (1-0.127)}{(0.05)^2}$$

$$= 171$$

$z^2_{1-\alpha/2}$ = 95% Confidence Level = 1.96
p = 12.7% = 0.127
d = 5% confidence interval

250 participants were selected by using multistage sampling method in this study, 250

questionaires were distributed. Out of all races, only non-Muslim students were included regardless of gender. Those who did not complete the questionaire and failed to provide informed consent were excluded and total number of 223 students participated (89.2% response rate).

Data was collected by using a structured questionnaire. The questionnaire consists of 3 main components where there were socio-demographic data, assessment of circadian preference by International Journal Chronobiology (IJC) and WHO alcohol use disorder identification test (AUDIT) [10,11].

First component, regarding socio-demographic data, we asked about their batch number, age, sex, ethnicity, religion, accommodation, number of siblings, parents educational level, monthly allowance and sponsorship.

The second component was on assessment of circadian preference done by J.A. Horne and O. Osterg, International Journal Chronobiology (IJC) [10]. We were able to categorize the participants into morningness, intermediate and eveningness based on a total number of 19 structured questions. The questions were regarding time they usually go to bed, time preference to perform physical activities, time they would get up if they were entirely free the whole day and alertness after a sleep. Circadian preference was categorized based on total scores obtained from the 19 questions into morningness, intermediate and eveningness by following the marking scheme suggested by J.A. Horne and O.Osterg, International Journal Chronobiology (IJC) [10]. Scores can be ranged from 16-86. Scores of 41 and below were catogerized into eveningness, scores of 59 and above were categorized into morningness and scores between 42-58 were intermediate [10].

Scores	Circadian preference
16-41	Eveningness
42-58	Intermediate
59-86	Morningness

The third component of this questionnaire was WHO Alcohol Use Disorder Identification Test (AUDIT) by Babor, TF, Higgins-Biddle, JC, Saunders, JB, Monteiro, MG [11]. It was evaluated by 10 structured questions and its domains and content were stated in the table below.

Domains and items content of AUDIT:

Domains	Question number	Item content
Hazardous alcohol use	1	Frequency of drinking
	2	Typical quantity
	3	Frequency of heavy drinking
Dependence symptoms	4	Impaired control over drinking
	5	Increased salience of drinking
	6	Morning drinking
Harmful alcohol use	7	Guilt after drinking
	8	Blackouts
	9	Alcohol-related injuries
	10	Others concerned about drinking

The participants were then categorized into addictive, high risk, moderate risk and low risk alcohol drinker based on the marking scheme reproduced by WHO. The suggested interventions for each risk level were as below [11].

AUDIT Scores:

Scores	Risk level	Alcohol risk	Intervention
0-7	1	Low risk	Alcohol education
8-15	2	Moderate risk	Simple advice
16-19	3	High risk	Simple Advice + Brief Counseling & Continued Monitoring
20-40	4	Addictive	Referral to Specialist for Diagnosis, Evaluation & Treatment

The scores for low risk alcohol consumers will be in the range from 0 to 7 in the questionnaire [11]. Low risk alcohol consumers indicates that the participants are having low risk for developing an alcohol use disorder (AUD) as defined by NIAAA and only require alcohol education as recommended by WHO [11,12]. NIAAA research showed that only about 2% people of this category had an AUD [12]. Participants who were categorized in low risk AUD need minimal intervention whereas for those who have scores of more than 7 were considered as moderate risk to addictive alcohol consumers who need more intervention [11].

2.1 Statistical Analysis

The data from questionnaires were tabulated in Microsoft Excel. We analyzed data using Epi Info 7 and SPSS software for both descriptive and inferential statistics. For descriptive statistics frequency, percentage, mean and standard deviation were used. For bivariate analysis, chi-square test and Fisher Exact test were used and multiple logistic regression analysis were used aw well to find the association of circadian preference and other demographic factors with risk for developing AUD. Significance level was set at 0.05. Odds ratio and its 95% confidence interval were described.

After getting approval from Research Committee of Melaka Manipal Medical College, students were approached during class period. Students were briefly explained regarding our research topic and consent from participants were taken in verbal and written form. Confidentiality of the data collected was ensured.

3. RESULTS

3.1 Socio-demographic Characteristic of Students

In Table 1, 223 of non-Muslim students responded to this study. 18.4% of the students were categorized in age group below 21, 52.5% of the students were 21 to 23 years old and 29.1% of them were 24 years old and above. 55.2% of the participants were male and 44.8% were female. There were 60.1% of Chinese and 39.9% of Indian participants. There were 13% of students who were having a monthly alowance of RM500 and below. 56.5% of them were having monthly allowance of RM501- 800 and 28.7% of the students were having RM801 and above per month.

Table 1. Socio-demographic characteristics of students (n=223)

Characteristics	Number (%)
Age	
≤20	41(18.4)
21-23	117(52.5)
≥24	65(29.1)
Mean ± SD	22.2 ± 2.27
Range	17-27
Sex	
Female	100(44.8)
Male	123(55.2)
Ethnicity	
Chinese	134(60.1)
Indian	89(39.9)
Hostelite	
Yes	122(54.7)
No	101(45.3)
Monthly allowance (RM)	
≤500	29(13.0)
501-800	126(56.5)
≥801	64(28.7)
Mean ± SD	792.6 ± 524.62
Range	400-2000

3.2 Prevalence of Circadian Preference in Study Participants with Different Characteristic

Out of 223 participants, 60.09% of them were having intermediate type of circadian preference, 21.97% of them were evening type and 17.94% of them were having morning type of circadian preference as shown in Table 2. Male students who were categorized in evening type of circadian preference were having a higher percentage which was 27.6% as compare to eveing-type female students who were only 15%.

3.3 Risk for Developing Alcohol Use Disorder among Students

In Table 3, 82.96% of the participants were categorized as low risk alcohol consumers, 13.90% of them were moderate risk alcohol consumers, 1.79% of them were categorized as high risk and 1.35% of them were addicted to alcohol.

3.4 Association between Circadian Preference and Risk for Developing Alcohol Use Disorder

In Fig. 1, highest percentage of medical students with evening type of circadian preference were moderate risk to addictive alcohol consumers as compared to other circadian preferences. On the other hand, higher percentage of medical students with morning type of circadian preference were low risk alcohol consumer.

3.5 Bivariate Analysis and Multiple Logistic Regression Analysis of Association between Circadian Preference and Risk for Developing Alcohol Use Disorder

17.04% of the participants were at moderate risk, high risk and addictive alcohol consumers and 82.96% of them were having low risk for developing alcohol use disorder. Participants with evening type of circadian preference were 4.5 times more likely to associate with higher risk for developing alcohol use disorder as compared to participants with morning type of circadian preference in bi-variate analysis(Unadjusted OR 4.5, 95% CI 1.2-17.0, P=0.02) but after they were adjusted for age, gender, ethnicity, hostel and monthly allowance in multiple logistic regression analysis, they were not significantly associated to each other.

3.6 Bivariate Analysis and Multiple Logistic Regression Analysis of Relationship between Socio-demographic Characteristics and Risk for Developing AUD

Compared to females, males were 4.5 times more likely to develop AUD (OR 4.5, 95% confidence interval [CI] 1.9 - 10.7). Students with monthly allowance more than RM 800 were 2.5 times more likely to be associated with a higher risk for developing AUD than students having monthly allowance from RM 501 to RM 801. Other than that, there were no significant association between age, ethnicity or accommodation with risk for developing AUD.

4. DISCUSSION

An analytical cross sectional study was conducted to find out the association between circadian preference and risk for developing alcohol use disorder among 223 non-Muslim medical students and pre-university students of a private medical college in Melaka, Malaysia. Out of 223 students, 60.09% were intermediate type, 21.97% were evening type and 17.04% were morning type of circadian preference. 82.96% of the participants were found to be low risk alcohol consumers, 13.90% of them were moderate risk, 1.79% of them were high risk and the remaining 1.35% of them were addicted to alcohol.

Table 2. Prevalence of circadian preference in study participants with different characteristics (n=223)

Study variable	Circadian preference N (%)		
	Morningness (n=40)	Intermediate (n=134)	Eveningness (n=49)
Age			
≤20	19(46.3)	10(24.4)	12(29.3)
21-23	21(11.9)	119(67.2)	37(20.9)
≥24	0(0.0)	5(100.0)	0(0.0)
Sex			
Male	17(13.8)	72(58.5)	34(27.6)
Female	23(23.0)	62(62.0)	15(15.0)
Ethnic			
Chinese	23(17.2)	83(61.9)	28(20.9)
Indian	17(19.1)	51(57.3)	21(23.6)
Monthly allowance			
≤500	5(17.2)	21(72.4)	3(10.3)
501-800	26(20.6)	68(54.0)	32(25.4)
≥801	9(14.1)	41(64.1)	14(21.9)

Table 3. Risk for developing alcohol use disorder among students (n=223)

Risk for developing AUD	N (%)
Addictive	3(1.35)
High risk	4(1.79)
Moderate risk	31(13.90)
Low risk	185(82.96)

As from the results of our study, participants with evening type of circadian preference were 4.5 times more likely to be associated with a higher risk for developing alcohol use disorder as compared to participants with morning type of circadian preference (Unadjusted OR 4.5, 95% CI 1.2-17.0, P=0.02) while the intermediate type was not significantly related. A research "Chronotype and personality factors in the daily consumption of alcohol and psycho-stimulants" also found that evening-type person was significantly more likely to be associated with alcohol consumption as compared to morning type person [7]. Individual with morning type of circadian preference was reported to be significantly associated with a lower chance of having health-impairing behaviours such as daily
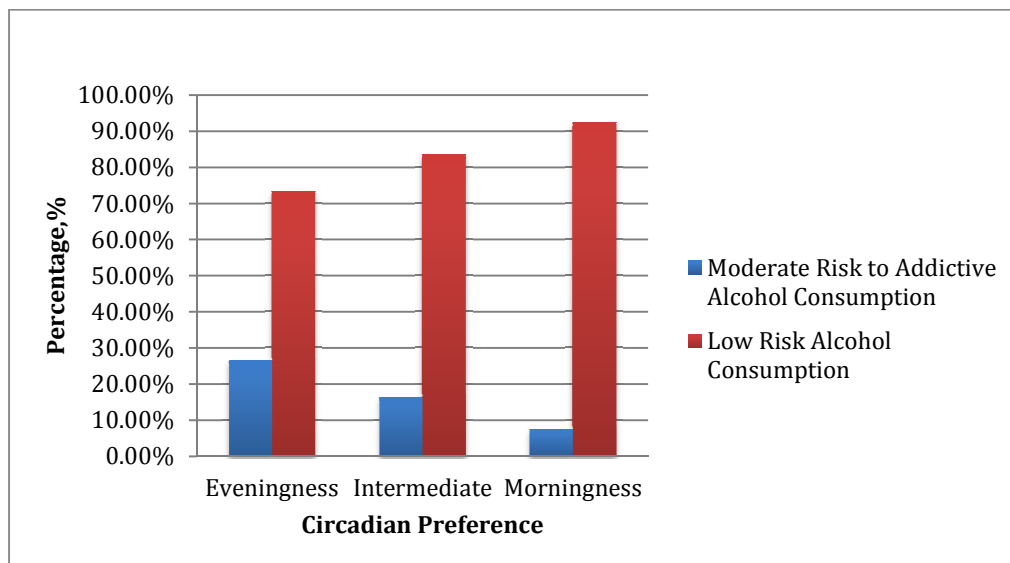

Fig. 1. Association between circadian preference and risk for developing AUD

Table 4. Bivariate analysis and multiple logistic regression analysis of association between circadian preference and risk for developing alcohol use disorder (n=219)

Circadian preference	Risk of developing AUD N (%)		Unadjusted OR (95% CI)	P-value	Adjusted OR (95% CI)
	Moderate, high risk & addictive	Low risk			
Eveningness	13 (26.5%)	36 (73.5%)	4.5 (1.2-17.0)*	0.020	3.6 (0.9-15.0)
Intermediate	22 (16.4%)	112 (83.6%)	2.4 (0.7-8.6)	0.158	1.9 (0.5-7.5)
Morningness	3 (7.5%)	37 (92.5%)	1 (Ref)	-	

*Adjusted for age, gender, ethnicity, hostel and monthly allowance; *significant*
AUD = Alcohol Use Disorder

Table 5. Bivariate analysis and multiple logistic regression analysis of relationship between socio-demographic characteristics and risk for developing alcohol use disorder (n=219)

Study variables	Risk of developing AUD N (%)		Unadjusted OR (95% CI)	Adjusted OR (95% CI)
	Moderate, high risk & addictive	Low risk		
Age				
≤20	5 (32.5)	36 (82.2)	1.0 (Ref)	
21-23	20 (17.1)	97 (82.9)	1.5 (0.5-4.3)	1.4 (0.3-5.4)
≥24	13 (20.0)	52 (80.0)	1.8 (0.6-5.5)	1.7 (0.4-6.6)
Sex				
Female	7 (7.0)	93 (93.0)	1 .0 (Ref)	
Male	31 (25.2)	92 (74.8)	4.5 (1.9-10.7)*	4.1 (1.6-10.5)*
Ethnicity				
Chinese	20 (14.9)	114 (85.1)	1.0 (Ref)	
Indian	18 (20.2)	71 (97.8)	1.4 (0.7-2.9)	1.0 (0.5-2.3)
Hostel				
Yes	19 (15.6)	103 (84.4)	1.0 (Ref)	
No	19 (18.8)	82 (81.2)	1.3 (0.6-2.5)	0.61 (0.2-1.5)
Monthly allowance				
≤500	7 (24.1)	22 (75.9)	2.4 (0.9-6.4)	0.5 (0.2-1.4)
501-800	15 (11.9)	111 (88.1)	1.0 (Ref)	
≥801	16 (25.0)	48 (75.0)	2.5 (1.1-5.4)*	1.0 (0.9-15.0)

*Significant; AUD = Alcohol Use Disorder

smoking ($p < .0001$) and alcohol use ($p < .0001$) in a study done in 2011 [1]. Furthermore, a study done on circadian gene polymorphism supported that there was association between circadian genes with alcohol consumption and alcohol abuse [9]. Hence, circadian preference of a person should be considered as an additional factor in alcohol consumption [13]. However, after taking consideration on other factors such as age, gender, ethnicity and monthly allowance in our study, the adjusted OR showed 3.6 with 95% confidence interval of 0.9-15.0 which was not significant. This was because the number of male among the participants from evening type of circadian preference was more than the number of male participants from morning type. Apart from that, female had higher number of morningness as compared to eveningness. In our study, the gender was also significantly associated with risk for developing alcohol use disorder. Male students were more likely to have evening type of circadian preference. Therefore, gender was a confounding variable that has affected the result to become not significant.

As mentioned above, we found that the gender was significantly associated with higher risk for developing alcohol use disorder. In our study, male students were 4.5 times more likely to

consume alcohol (Unadjusted OR 4.5, 95% CI 1.9-10.7). A study by WHO, global status report on alcohol and health (country profile: Malaysia) found that gender was a factor associated with alcohol consumption among non-Muslim adults [6]. Likewise as from a research done to study tobacco and alcohol use among medical students in 1996, there was an association between gender and alcohol consumption [14]. The most probable reason for drinking was pleasure, followed by habit, to increase confidence, release anxiety or stress and social pleasure [4].

Furthermore, students with monthly allowance ≥RM 801 were 2.5 times more likely to be associated with a higher risk for developing alcohol use disorder than students having monthly allowance between RM 501-800 (Unadjusted OR 2.5, 95% CI 1.1-5.4). This showed that students with a higher socioeconomic status were more able to afford the expenses on alcohol drinks. It was corresponding to other researches that had been done. They said that, individual with higher monthly allowance have higher tendency to consume alcoholic drinks [15,16].

5. STRENGTH

Participants who had done the survey were given reassurance that data will be kept anonymous by removing participants name. Privacy and Confidentiality were ensured.

6. LIMITATION

There were a few limitations which may affect the outcome of our study. Firstly, a small number of the selected students who consume alcohol refused to respond to the questionnaires and may affect the results of our study. Secondly, due to religious belief, our questionnaires were distributed only to non-muslim students. Thirdly, there could be underreporting of other health risk behaviours in this study like smoking and drug use. This study had not explored the association of circadian preference with the other health risk behaviours such as drunk driving, elicit drug use, suicide, promiscuity, etc. Our study statistics were not representative for any other age group and not representing the whole Malaysian population as we conducted this study in a private college in Melaka only.

7. RECOMMENDATION

Our study suggests an obvious need for an effective educational and prevention programs targeted toward improving sleep hygiene and reducing alcohol consumption among young adults. From our point of view, students are encouraged to develop morning type of circadian preference. Other studies had shown that evening type of circadian preference might contribute to antisocial behaviours and substance abuse that may have serious implication in later life. Besides that, we should provide adequate counseling to medical students about the disadvantages of alcohol use. A referral to specialist for diagnosis, evaluation and treatment should be done for those who were in addictive category as recommended by WHO [11] Based on our study, senior batches were more likely to consume alcohol compared to foundation students as this might be due to workload that they encountered. By educating them on time and stress management, the amount of students consuming alcohol would significantly decrease. In addition, institution should organize more extra-curricular activities after class period and motivate student to be more physically active. In turn, it is able to prevent students from consuming alcohol during their free time and it provides opportunities for the students to relieve stress.

8. CONCLUSION

According to WHO alcohol identification test in our study, 13.9% of the participants were having moderate risk for developing alcohol use disorder, 1.79% were high risk and 1.35% were addictive to alcohol. As a conclusion, circadian preference of a person should be considered as an additional factor in alcohol consumption especially in the context of risk for developing AUD. Although circadian preference was only signifcantly associated to the risk for developing alcohol use disorder in bi-variate analysis before adjusted with other factors in multiple logistic regression, the relationship between circadian preference and risk for developing alcohol use disorder among the alcohol consumers should not be neglected. We should provide adequate counseling about sleep hygiene, healthy sleep-wake cycle and encourage students to develop morning type of circadian preference in order to reduce the risk of developing alcohol use disorder. Students are discouraged from developing evening type of circadian preference as it may contribute to negative psychosocial

behaviours and substance abuse especially alcohol consumption which may have serious implication in later life.

ETHICAL APPROVAL

ACKNOWLEDGEMENTS

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Urban R, Magyarodi T, Rigo A. Morningness-eveningness, chronotypes and health-impairing behaviors in adolescents. Chronobiology Int. 2011; 28(3):238–47.
2. World Health Organization Report. Global status report on alcohol and health 2014 Ed.: Status report without country profile; 2014.
3. Frank E, Elon L, Naimi T, Brewer R. Alcohol consumption and alcohol counseling behaviour among US Medical students: Cohort study. BMJ. 2008;337: a2155.
4. Webb E, Ashton CH, Kelly P, Kamali F. Alcohol and drug use in UK university student. The Lancet. 1996;348.9032:922-925.
5. Newbury-Birch D, White M, Kamali F. Factors influencing alcohol and illicit drug use amongst medical students. Drug and Alcohol Dependence. 1999;59(2000):125-130.
6. World Health Organization Report. Global status report on alcohol and health 2014 Ed.: Individual country profile, Malaysia; 2014.
7. Adan A. Chronotype and personality factors in the daily consumption of alcohol and psychostimulants. Addiction. 1994; 89(4):455–62.
8. Tankova I, Adan A, Buela-Casal G. Circadian typology and individual differences, A review. Personality and Individual Differences. 1994;16(5):671–684.
9. Kovanen L, Saarikoski ST, Haukka J, Pirkola S, Aromaa A, Lönnqvist J, Partonen T. Circadian clock gene polymorphisms in alcohol use disorders and alcohol consumption. Alcohol Alcohol. 2010;45(4):303-311.
10. Horne JA, Ostberg O. A self assessment questionnaire to determine morningness to eveningness in human circadian rhythms. International Journal of Chronobiology. 1976;4(2):97-110.
11. Babor TF, Higgins-Biddle JC, Saunders JB, Monteiro MG. The alcohol use disorder identification test: Guidelines for use in primary care, 2nd Ed, World Health Organization, Department of Mental Health and Substance Dependence; 2001.
12. Alcohol Facts and Statistics. Overview of alcohol consumption, National Institute on Alcohol Abuse and Alcoholism; 2016. Available:https://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption/alcohol-facts-and-statistics (Viewed 12 February 2016)
13. Wittmann M, Paulus M, Roenneberg T. Decreased psychological well-being in late 'chronotypes' is mediated by smoking and alcohol consumption. Substance Use Misuse. 2010;(1-2):15-30.
14. Mangus RS, Hawkins CE, Miller MJ. Tobacco and alcohol use among 1996 medical school graduates. The Journal of American Medical Association. 1998; 280(13):1192-1195.
15. Humensky JL. Are adolescents with high socioeconomic status more likely to engage in alcohol and illicit drug use in

early adulthood? Substance Abuse Treatment, Prevention and Policy. 2010; 5:19.

16. Martin BA, McCoy TP, Champion H, Parries MT, Durant RH, Mitra A, Rhodes SD. The role of monthly spending money in college student drinking behaviors and their consequences. Journal of American College Health. 2009; 57(6):587-596.