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Sleep Onset Latency In Students Living In Dormitories At Tehran University of Medical Sciences : A Survival Analysis.

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ABSTRACT

Difficulty Initiating Sleep is a prevalent disorder in university students. In this study, we aimed to estimate the time of going to bed to get sleep and to identify its determinants by survival analysis. This study is based on a cross-sectional study that was been performed on 277 students who lived in dormitories of Tehran University of Medical Sciences (TUMS). We used Pittsburgh Sleep Quality Index(PSQI), General Health Questionnaire(GHQ) and a demographic questionnaire for data collection. Independent t-test, One-way ANOVA and survival analysis were used for analyzing the data. Mean ± SD of time of going to bed to get sleep was 23.61±16.31 minutes. Range of this time was between 0 to 90 minutes. This time was related to sleep quality, mental health and tea drinking in univariate analysis. Cox regression model showed sleep quality, working alongside academic affairs, financial source type for living expences and effect modification between two last variables were significant determinants of sleep latency. All determinants of sleep latency in our study are changeable factors. It means educationonal programs can play a very important role in controlling of these factors and improvement of sleep status of dormitory students.

Keywords: Sleep Latency; Dormitory; University students; Survival analysis

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INTRODUTION

Sleep medicine has found lately a special place in modern medicine as a result of increasing prevalence of sleep disorders[1]. Approximately one-third of adults suffer from sleep problems[2]. Blunden and Galand say sleep duration has significantly decreased in human societies in comparing to pre-industrial times as a result of using artifical lighting, allowing 24-hours functioning. They say "we are living in a sleep-deprived society"[3]. One of the prevalent sleep disorders is sleep latency[4]. Sleep Latency difined as prolonging the time that one consumes to fall asleep after going to bed[5].

Holm et al believed that multiple psychological and physiological factors such as delay in circadian timing of sleep can result in sleep latency[6]. This disorder can result in insufficient sleep and its outcomes such as impaired concentration, amnesia, inability in daily stresses managing, decreasement of sexual desire and so on[1, 7].

Sleep deprivation lead to neurological, behavioral and physiological changes; failures in daily functions; absence from classroom or sleepiness during attendance in it[8].

Witkowski et al implied college student populations don't rest sufficiently. According to their study difficulty initiating of sleep is reported by 18% of college students[9]. Mousavi et al estimated the prevalence of this disorder in medical students as 7.3% [4]. In another study, Mean± SD of time to onset of sleep is estimated 30.2± 14.9 minutes. In fact, 52.1% of participants have reported that their sleep starts more than 30 minutes after going to bed[10]. In the other study this time was reported more than 15 minutes by 39% of students[11].

Pagal has investigated the patterns of sleeping and waking in a number of students. His study showed that 69.7% of students with low grade point average (GPA) have had difficulty in getting to sleep. Furthermore, 72.7% of students with low sleep quality had concentration and attention difficulties in daily activities[12]. According to a study at Shahed University on 300 students the prevalence of insomnia, daily sleepiness, difficulty initiating sleep and difficulty maintaining sleep are estimated as 22.5%, 64.5%, 48.5% and 17%, respectively [11].

Our aim is estimating the mean time between going to bed and getting to sleep "Time to Onset of Sleep (TOS)" as an indicator of sleep latency and identifying some of its determinants by survival analysis. We hope our study can pave the way toward improvement and promotion of sleep quality in this group of students.

PATIENTS AND METHOD

This research is based on data of our primary study on quality of sleep in dormitory students[13-14]. In that cross-sectional study, 277 students residing in TUMS dormitories were selected using the stratified random sampling approach. We measured the sleep quality by Pittsburgh Sleep Quality Index (PSQI). demographic questionnaire and General Health Questionnaire (GHQ) was also completed by students . Further informatiuon of the study was presented in elsewhere[13-14]. Demograpic characteristics of our sample are presented in table 1. In this study we used the survival analysis technique for measuring the time to starting of sleep (interval between going to bed and getting to sleep). We estimated survival functions by Kaplan-Meier method. Log-rank test (with $\alpha = 0.05$) was used for comparing of survival curves. All analyses were run by STATA. Informed consent was obtained from all participants in primary study.

RESULTS

Based on our first findings[13], 73.3% (95% CI: 68.1%-78.5%) of students suffered poor quality of sleep. The mean ± standard deviation of TOS (minute) was 23.61 ± 16.31 with range 0 to 90 minutes. We estimated TOS by demographic variables. These results are presented in Table2. As shown this time is longer in females, dentistry students, undergraduates, singles, self-suppliers of living expences, students with low-income families, students who worked alongside academic affairs, not athletes, students without a previous history of living in dormitory, students with 5-10 hours computer working per week, smokers, more than 4 roommates possessors , students drinking 1-3 cup of tea per day, coffee consumers, students

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with poor quality of sleep and mental health. However, these differences were only statistically significant for tea drinking, sleep quality and mental health variables.

Kaplan-Meier estimates

We estimated survival functions for the aforementioned significant variables. Results are displayed in figure 1-3:

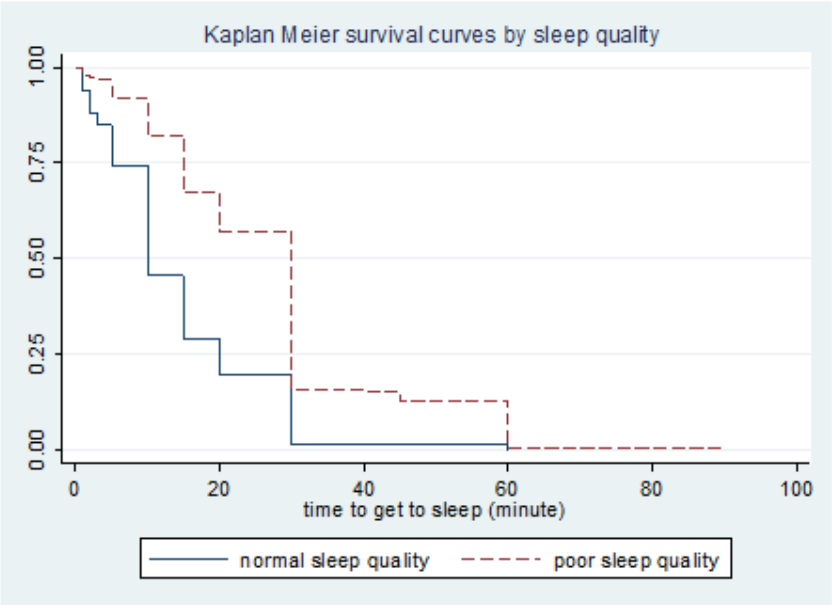
by sleep quality Kaplan Meier survival estimates and curves Figure1.

Survival functions of time between going to bed and getting to sleep by sleep quality

Time to getting to sleep	Survival function	
	Normal SQ*	Poor SQ*
0	1.0000	1.0000
10	0.4545	0.8209
20	0.1970	0.5721
30	0.0152	0.1529
40	0.0152	0.1542
50	0.0152	0.1294
60	0.0000	0.0050
70	.	0.0050
80	.	0.0050
90	.	0.0000

Log rank test results:
Chi2(1) = 44.28 , p-value < 0.0001

*Sleep Quality



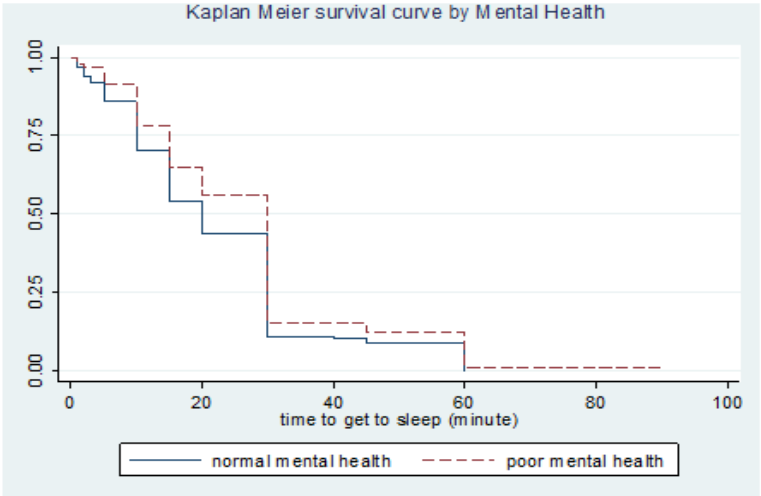
Kaplan Meier survival estimates and curves by mental health Figure2.

Survival functions of time between going to bed and getting to sleep by Mental Health

Time to getting to sleep	Survival function	
	Normal MH*	Poor MH*
0	1.0000	1.0000
10	0.7045	0.7802
20	0.4375	0.5604
30	0.1080	0.1538
40	0.1023	0.1538
50	0.0909	0.1209
60	0.0000	0.0110
70	.	0.0110
80	.	0.0110
90	.	0.0000

Log rank test results:

Chi2(1)= 3.63, p-value = 0.0567



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Kaplan Meier survival estimates and curves by tea drinking Figure3.

Survival functions of time between going to bed and getting to sleep by tea drinking

Time to getting to sleep	Survival function		
	No drinking	1-3 cups per day	>=4 cups per day
0	1.0000	1.0000	1.0000
10	0.6842	0.7582	0.6569
20	0.4211	0.5165	0.3830
30	0.0263	0.1538	0.0851
40	0.0263	0.1538	0.0638
50	0.0263	0.1264	0.0638
60	0.0000	0.0055	0.0000
70	.	0.0055	.
80	.	0.0055	.
90	.	0.0000	.

Log rank test results:

Chi2(1) = 5.72, p-value < 0.0001

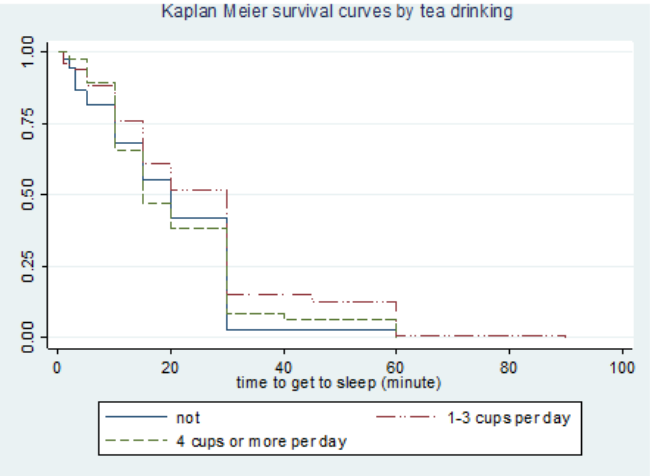

Figure 1 shows the Kaplan-Meier survival functions and curves for students with poor and normal sleep quality(SQ). Log-rank test showed a statistically significant difference between these survival estimates (P< .0001). These curves demonstrate the frequency of students who could not get to sleep by time (minutes). For example at 0th minute 100% students with poor and normal SQ, at 30th minute 1.52% of students with normal SQ and 1.59% of students with poor SQ and at 60th minute 0% of students with normal SQ and 0.5% of students with poor SQ still are stayed awake. Hence, based on these finding, students with poor SQ have worse status than normal sleepers in the all time points.

Kaplan-Meier estimates by mental health status are indicated in figure 2. Log-rank test showed a borderline statistically significant difference between these survival estimates (P< .056). These curves demonstrate students with poor mental health have worse status versus their normal counturparts in all time points. For example median survival time is 20 minutes and 30 minutes for students with normal and poor mental health, respectively. It means the time that 50% of normal mental health group get to sleep after arrival to bed is 20 minutes while it is 30 minutes in other group.

Survival estimates by tea consumption are shown in figure3. These estimates are in favoring to table2. It means students in middle group (drinking 1-3 cup/s of tea per day) have worse status than two other groups. Median survival time (minute) is 15, 30 and 20 for no drinkers, drinkers of 1-3 cups per day and drinkers of 4 or more cups per day, respectively.

Finally, we have run a Cox proportional hazard model. Backward approach was used for this modeling. Final model is presented in table 3. This table indicates covariates including sleep quality, working alongside academic affairs, financial source type for living expenses and interaction between working alongside academic affairs and financial source type for living expenses had a statistically significant relationship to TOS.

DISSCUSION

One of the most-often reported sleep disorders is latency in getting asleep. This disorder can be measured by Time to Onset of Sleep(TOS). We indicated that students living in dormitories of TUMS get sleep

averagely 24 minutes after going to bed. This time is estimated as 20.9 minutes in students residing in dormitories in Japan[15]. Marzano et al. estimated this time as 11.15 minutes in 40 healthy subjects[16]. Zhou et al showed the mean±SD of this time in persons with disordered sleep and normal persons 20.9± 23.3 and 14.2± 7.0 minutes, respectively[17]. Therefore, it can be said TOS in our study is more similar to it in persons with disordered sleep than persons with normal sleep status. It may be a result of being low sleep quality in high percent of our sample. Based on our primary study, 73.3% of students had weak sleep quality[13].

Table 1. demographic characteristics of participants

variable		Mean	SD
Age		23.4	2.7
Duration of inhabitancy in dormitory(years)		3.9	2.2
Roomates Counts		3.4	1.2
Hours computer working per week		15.7	15.9
variable		Numbur	%
Gender	female	158	43.0
	male	119	57.0
Academic field	Medicine	94	33.9
	Dentistry	24	8.7
	Pharmacy	46	16.6
	Other fields	107	38.6
	Unknown	6	2.2
Degree of course	Undergraduate	65	23.5
	Postgraduate	51	18.4
	Professional Doctorate	159	57.4
	Unknown	2	0.7
Marital status	Single	256	92.4
	Married	19	6.9
	Unknown	2	0.7
Source for supplying living expenses	Family	234	84.8
	Him/herself	43	15.2
Family outcome	<2500000 RLS	19	6.9
	2500000-4500000RLS	56	20.2
	> 4500000RLS	199	71.8
	Unknown	3	1.1
Working alongside academic activities	Never	184	66.3
	Occassional	57	20.7
	Part -time	30	10.8
	Full-time	6	2.2
Weekly exercise	Yes	93	33.7
	No	184	66.3
Dormitory dwelling history	Yes	131	47.3
	No	130	46.9
	Unknown	16	5.8
Current smoking	Yes	25	9.1
	No	252	90.9
Tea drinking per day	0 cup	41	14.8
	1-3 cup	187	67.5
	4 or more	49	17.7
Coffee drinking per day	0 cup	47	17.1
	1 cup or more	230	82.9
Poor Quality of Sleep	Yes	203	73.3
	No	74	26.7
Poor Mental health	Yes	95	34.3
	No	182	65.7

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Table2. comparison of Mean of time to go to sleep by demographic variables

variable		Mean (SD)	P-value
gender	female	24.53(17.37)	0.277
	male	22.34(14.68)	
Age group	< 24 years	24.51(18.04)	0.377
	>=24 years	22.74(13.91)	
Academic field	Medicine	22.47(16.03)	0.644
	Dentistry	27.29(15.89)	
	Pharmacy	23.31(18.67)	
	Other fields	23.63(15.65)	
Degree of course	Undergraduate	25.43(17.13)	0.446
	Postgraduate	21.51(14.43)	
	Professional Doctorate	23.58(16.64)	
Marital status	Single	23.75(16.08)	0.502
	Married	21.06(20.23)	
Source for supplying living expenses	Family	23.41(16.29)	0.531
	Him/herself	25.18(16.64)	
Family outcome	<2500000 RLS	27.22(14.47)	0.320
	2500000-4500000RLS	25.52(16.38)	
	> 4500000RLS	22.70(16.22)	
Working alongside academic activities	Never	24.79(16.57)	0.437
	Occassional	21.60(16.48)	
	Part -time	21.62(14.85)	
	Full-time	18.67(10.61)	
Weekly exercise	Yes	22.74(15.75)	0.507
	No	24.13(16.62)	
Dormitory dwelling history	Yes	23.16(15.12)	0.448
	No	24.73(17.93)	
Roommate number	<=3	23.30(15.08)	0.626
	>=4	24.00(17.21)	
Hours computer working per week	< 5h	22.46(17.00)	0.849
	5-10h	24.16(17.23)	
	>10h	23.50(15.35)	
Current smoking	Yes	26.92(16.32)	0.305
	No	23.33(16.33)	
Tea drinking per day	0 cup	18.93(12.89)	0.026
	1-3 cup	25.44(17.20)	
	4 or more	20.56(14.24)	
Coffee drinking per day	0 cup	23.49(16.35)	0.821
	1 cup or more	24.09(16.43)	
Poor Quality of Sleep	No	13.94(11.04)	<0.001
	Yes	26.85(16.52)	
Poor Mental health	No	22.21(15.71)	0.048
	Yes	26.35(17.17)	

Table3. Cox Proportional Hazard model

Variables	Hazard Ratio	Standard Error	Confidence Interval	P-value
Poor SQ[a]	0.45	0.07	0.34 - 0.60	< 0.0001
Financial Source[b]	4.03	2.91	0.98 – 16.61	0.054
Working[c]	10.46	8.46	2.14 - 51.02	0.004
S × W[d]	0.15	0.11	0.034 – 0.67	0.013

[a] Sleep Quality (0 = no / 1= yes)
[b] Source for supplying living expenses (0 = family / 1= him/herself)
[c] Working alongside academic activities (0 = no / 1= yes)
[d] interaction between Source of supplying living expenses and Working alongside academic activities

One of the variables with statistically significant relationship to TOS in this study was Sleep Quality. This can be somewhat predictable as a result of intrinsic correlation between these two variables. It means both variables are related to a same theme(sleep). Thus they can have high correlation to each other. Even one of reasons of low sleep quality in these students may be long TOS. According to Lack et al. 50% of students with sleep latency problem have insufficient sleep and need to at least 30 minutes or more sleep in order to become relaxed[9].

One of the other determinants of sleep latency in our study was mental health. We displayed that poor mental health group significantly spent more time in bed for getting to sleep versus their counterparts. Multiple studies have shown this relationship [18-21]. According to Aloba et al clinical findings have shown sleep disturbance is one of the earliest psychopathological symptoms of that would be measured with the General Health Questionnaire[20]. Lund et al. also implied that low mood is one of the strong predictors of sleep quality[1]. In the other hand Kaneita et al have found that mental health and sleep quality are mutually related[22]. Therefore, it could be concluded student's daily affective problems and concerns , suddenly stormed into their mind when they go to bed and are causing a delay in their sleep.

Another determinant of sleep latency was tea drinking. Tseng et al have reported that tea drinking leads to delay of sleep onset and disturbance of its pattern because of coffeine content. Moreover, They have implied that drinking of tea has also a significant effect on the sleep quality in university students[23]. Zencirci also belives drinking of tea or coffee is an effective factor on sleep quality and quantity[24]. Veldi et al. have worked on sleep quality in medical students. According to their study, caffeine consumption lately at night—close to bedtime—can lead to delays in getting to sleep and sleep problems[25]. While a regardable finding was longer TOS in students who drinking 1-3 cup/s of tea per day then their counterparts with 4 or more cups of tea per day. We guess later time of tea drinking or being more concentrated drinked tea may be some reasons for this finding. Furtheremore, frequency of students in this group is more than two other groups, using cox regression model, we found two other variables with a statistically significant relationship to sleep latency addition to sleep quality. Students who worked alongside education had more sleep latency. Mousavi et al have shown the same result [4]. Based on our primary study[13], more than 30 percent of these students worked alongside eduaction. Thus, it should be said work-related stresses and fatigue combined with other problems of students have resulted in delaying of their nightly sleep followed by enganging their minds. meanwhile, sleep latency was significantly related to financial source type of living expences. In essence, Students who had to support themselves spent more time to start of their sleep. Obviously, when a student have no source to cover living expences or his/her family is not able to supprt him/her, he/she may face anxiety or worriness. This issue can affect his/her sleep. Pallos et al have also hinted to this finding[15]. The effect of these two variables interactively was protective in this model. We explained this event in this way that students who works can supply the costs of their life themselves. This will decrease the student's worries and help them to relax. Sleep pattern may be corrected following it.

CONCLUSION

Our study showed night sleep duration is considerably less than time of being in bed in students living at dormitories. It means these students spent a long waiting time in bed for starting of their sleep. Some of determinants of this delay were mental health, sleep quality and tea drinking. Clearly all of these factors are changeable. Education can play an important role in change of these factors in order to improve sleep of these students.

Limitation: This was a small cross-sectional study. Further researches like longitudinal studies on larger samples in the future is needed toward better investigation of this problem and its determinants.

Authors' contributions

AM planned the study, analyzed the data, interpreted the results and prepared the manuscript. YM was responsible for data gathering in male students. He also reviewed the manuscript and revised it. ZT collected female student's data and preformed manuscript for submission and was responsible for submitting and its followings up.

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