



UNIVERSITI PUTRA MALAYSIA

***PREVALENCE AND PREDICTORS OF POOR SLEEP QUALITY AMONG
SECONDARY SCHOOL STUDENTS IN GOMBAK, SELANGOR,
MALAYSIA***

KESINTHA DEVI A/P APPANNA

FPSK(M) 2017 50



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MALAYSIA**

By

KESINTHA DEVI A/P APPANNA

**Thesis Submitted to the School of Graduate Studies, Universiti Putra
Malaysia, in Fulfillment of the Requirements for the Degree of
Master of Science**

July 2017

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DEDICATION

This thesis is dedicated to my parents, supervisor, and friends for their financial, moral and spiritual support.



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in
fulfillment of the requirement for the Degree of Master of Science

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**Chairman : Professor Lekhraj Rampal a/l Gyanchand Rampal, MBBS,
MPH (Hons), DrPH, FRSH, FAMM, FAMS, FPHMM**
Faculty : Medicine and Health Sciences

Poor sleep quality among adolescents is becoming a major worldwide concern and widely recognized as a significant public health issue. Increasing school, family, social pressure and environmental issues among adolescents indirectly lead to a delay of sleep timing together with the change in the intrinsic regulation of both circadian and homeostatic processes. In Malaysia, the prevalence of poor sleep quality is high, 30-67% reported among university students and working adults. However, there has been no study on poor sleep quality among secondary school students in Malaysia found to date. Thus, this study was conducted to determine the prevalence and predictors of poor sleep quality among secondary school students in Gombak, Selangor.

A cross-sectional study was conducted among 1016 secondary school students of form 1, 2, and 4 in two government secondary schools in Gombak District using sampling with probability to proportionate to size from July 2015 to September 2015. Self-administered pretested questionnaires were used to capture socio-demographic characteristic, academic performance and psychological factor (depression, anxiety, and stress). Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI) and further distinguished from “poor” to “good” sleep quality.

The response rate was 93.0%. The prevalence of poor sleep quality was 24.0% (95% CI = 21.5, 26.6). Highest prevalence (34.1%) of poor sleep quality was among 16 to <17 year old students. Females (28.1%) had significantly higher prevalence of poor sleep quality compared to males (21.3%). Students with divorced or widow parents (60.9 %) had significantly higher proportion of poor sleep quality than those with married parents (17.6%) ($\chi^2= 132.42$, $df =1$, $p<0.001$).

Students reporting depression (42.1%) had significantly higher proportion of poor sleep quality compared to those with no depression (8.1%) ($\chi^2=159.96$, $df =1$, $p<0.001$). Students reporting anxiety (41.4%) had significantly higher proportion of poor sleep quality than those with no anxiety (4.8%) ($\chi^2= 186.11$, $df =1$, $p<0.001$). Prevalence of poor sleep quality was also significantly higher among those reporting stress (39.9%) than those not reporting stress (8.2%) ($\chi^2= 139.74$, $df =1$, $p<0.001$) and among those who scored poorly in their examination (45.6 %) compared to those scoring well (6.9%) ($\chi^2= 172.19$, $df =1$, $p<0.001$).

Multiple logistic regression was used to determine the predictors of poor sleep quality and the significant and independent predictors of poor sleep quality as follows: aged 16 to <17 years (adjusted OR=3.10, 95% CI= 1.19, 8.05, $p=0.02$), divorced or widow parents (adjusted OR=6.21, 95% CI =3.63, 10.29, $p<0.001$), depression (adjusted OR=5.42, 95% CI = 3.45, 8.54, $p<0.001$), anxiety (adjusted OR=8.68, 95% CI= 5.13, 14.71, $p=0.001$), stress (adjusted OR=4.27, 95% CI =2.70, 6.77, $p<0.001$) and poor and average academic performance (adjusted OR=5.83, 95% CI= 3.43, 10.02, $p<0.001$) and (adjusted OR=3.67, 95% CI = 2.14, 6.39, $p<0.001$) respectively.

In conclusion, the prevalence of poor sleep quality was 24%, considerably high among secondary school students. Older age group, divorced or widow parents, depression, anxiety, stress and poor-average academic performance were the independent predictors of poor sleep quality among secondary school students. A cohort study is needed to confirm the factors associated with poor sleep quality among secondary school students.

Keywords: Factors, secondary school student, sleep quality, depression, anxiety, stress, academic performance, Gombak.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Sarjana Sains

**PREVALEN DAN PERAMAL KUALITI TIDUR YANG KURANG
MEMUASKAN DALAM KALANGAN PELAJAR SEKOLAH MENENGAH
DI GOMBAK, SELANGOR, MALAYSIA**

Oleh

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Kualiti tidur yang kurang memuaskan dalam kalangan remaja sedang menjadi isu utama di seluruh dunia dan juga dianggap sebagai isu kesihatan yang sangat penting. Tekanan yang semakin meningkat di sekolah, keluarga, masyarakat dan perubahan persekitaran dalam kalangan para remaja secara tidak langsung mengakibatkan masa tidur yang semakin lewat dan perubahan kepada kawal selia intrinsik dalam kedua-dua proses sirkadian dan homeostasis. Di Malaysia, prevalens kualiti tidur yang kurang memuaskan adalah tinggi, 30-67% dilaporkan di kalangan pelajar universiti dan orang dewasa yang bekerja. Akan tetapi, tiada kajian mengenai kualiti tidur yang kurang memuaskan antara pelajar sekolah menengah ditemui sehingga sekarang. Oleh itu, kajian ini telah dijalankan untuk menentukan prevalen dan peramal bebas kualiti tidur yang kurang memuaskan dalam kalangan pelajar sekolah menengah di Gombak, Selangor.

Satu kajian keratan rentas telah dijalankan dalam kalangan 1016 pelajar sekolah menengah tingkatan 1,2 dan 4 di dua buah sekolah menengah di daerah Gombak dengan menggunakan kaedah pensampelan kebarangkalian berkadar dengan saiz dari Julai 2015 sehingga September 2015. Soal selidik yang diisi sendiri oleh pelajar telah digunakan untuk merekod ciri-ciri sosio-demografi, prestasi akademik, dan faktor psikologi (kemurungan, kebimbangan, dan tekanan). Kualiti tidur disukta menggunakan Indeks Kualiti Tidur Pittsburgh (PSQI) yang seterusnya dibezakan antara kualiti tidur yang 'baik' dari 'tidak baik'.

Kadar respons adalah 93.0%. Prevalens kualiti tidur yang kurang memuaskan adalah 24.0% (95% CI = 21.5, 26.6). Prevalen kualiti tidur yang kurang memuaskan adalah paling tinggi dalam kalangan pelajar berumur 16 hingga < 17 tahun iaitu 34.1%. Wanita mempunyai prevalen kualiti tidur kurang memuaskan lebih tinggi iaitu (28.1%) berbanding dengan lelaki iaitu (21.3%). Dalam kalangan pelajar yang status perkahwinan ibu-bapa mereka yang bercerai (60.9%), peratusan kualiti tidur yang kurang memuaskan adalah lebih tinggi berbanding dengan mereka yang ibu-bapanya mempunyai status masih berkahwin ($\chi^2 = 132.42$, $df = 1$, $p < 0.001$).

Pelajar-pelajar yang mengalami masalah kemurungan (42.1%) menunjukkan peratusan kualiti tidur yang kurang memuaskan lebih tinggi berbanding dengan pelajar-pelajar yang tiada masalah tersebut (8.1%) ($\chi^2 = 159.96$, $df = 1$, $p < 0.001$). Pelajar-pelajar yang mempunyai masalah kebimbangan (41.4%) juga menunjukkan peratusan kualiti tidur yang kurang memuaskan yang lebih tinggi berbanding dengan mereka yang tiada masalah kebimbangan (4.8%) ($\chi^2 = 186.11$, $df = 1$, $p < 0.001$). Peratusan kualiti tidur yang kurang memuaskan juga adalah tinggi bagi mereka yang mengalami tekanan (39.9%) berbanding dengan mereka yang tidak mengalami tekanan (8.2%) ($\chi^2 = 139.74$, $df = 1$, $p < 0.001$) dan yang mempunyai prestasi buruk dalam peperiksaan (45.6 %) ($\chi^2 = 172.19$, $df = 1$, $p < 0.001$).

Regresi Logistik multipel telah digunakan untuk menentukan peramal kualiti tidur yang kurang memuaskan. Peramal bebas and signifikan kualiti tidur yang kurang memuaskan adalah sepertimana berikut: umur 16 hingga <17 tahun (adjusted OR=3.10, 95% CI= 1.19, 8.05, $p = 0.02$), ibu-bapa yang bercerai (adjusted OR=6.21, 95% CI = 3.63, 10.29, $p < 0.001$), kemurungan (adjusted OR=5.42, 95% CI = 3.45, 8.54, $p < 0.001$), kebimbangan (adjusted OR=8.68, 95% CI= 5.13, 14.71, $p = 0.001$), tekanan (adjusted OR=4.27, 95% CI = 2.70, 6.77, $p < 0.001$) dan pencapaian akademik yang rendah (adjusted OR=5.83, 95% CI= 3.43, 10.02, $p < 0.001$) and sederhana (OR=3.67, 95% CI = 2.14, 6.39, $p < 0.001$).

Kesimpulannya, peratusan kualiti tidur yang kurang memuaskan dalam kalangan pelajar sekolah menengah adalah 24%, cukup tinggi. Usia tua, ibu-bapa bercerai, kemurungan, kebimbangan, tekanan, dan pencapaian akademik yang kurang memuaskan merupakan faktor yang mempengaruhi kualiti tidur yang kurang memuaskan dalam kalangan pelajar sekolah menengah. Kajian kohort diperlukan untuk memastikan faktor-faktor yang dikaitkan dengan kualiti tidur yang kurang memuaskan dalam kalangan pelajar sekolah menengah.

Kata Kunci: Faktor, pelajar sekolah menengah, kualiti tidur, kemurungan, kebimbangan, tekanan, prestasi akademik, Gombak

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I certify that a Thesis Examination Committee has met on 28 July 2017 to conduct the final examination of Kesintha Devi a/p Appanna on her thesis entitled "Prevalence and Predictors of Poor Sleep Quality among Secondary School Students in Gombak, Selangor, Malaysia" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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LIST OF ABBREVIATIONS

%	Percentage
<	Less than
>	Greater than
≥	Greater than or equal to
ADAA	Anxiety and Depression Association of America
AOR	Adjusted Odds Ratio
APA	American Psychological Association
BISS	Behaviour Induced Insufficient Sleep Syndrome
CDC	Center for Disease Control
CI	Confidence Interval
COR	Crude Odds Ratio
DASS	Depression, Anxiety, Stress Scale
GPS	Grade percentage of Student
MOE	Ministry of Education
MOH	Ministry of Health
NHMS	National Health and Morbidity Survey
NIH	National Institute of Mental Health
No	Number
NSF	National Sleep Foundation
OR	Odds Ratio
p	α level of significance
PSQI	Pittsburgh Sleep Quality Index
ROC	Receiver Operating Characteristics

RM	Ringgit Malaysia
SBPI	‘Sekolah Berasrama Penuh Intergrasi’
SD	Standard deviation
SE	Standard Error
SMK	‘Sekolah Menengah Kebangsaan’
SPSS	Statistical Package for the Social Sciences
USDHHS	United State Department of Health and Human Services
UPM	Universiti Putra Malaysia
UAE	United Arab Emirates
US/USA	United States of America
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background

Adolescents need good quality of sleep as it is a critical component for both mental and physical health for an adolescent. Good quality of sleep refers to one's satisfaction of the sleep experience, integrating aspects of sleep initiation, sleep maintenance, sleep quantity and refreshment upon awakening (National Sleep Foundation [NSF], 2016). Good quality of sleep helps in cognitive restitution, memory consolidation, learning, decision making and processing of an individual (Smaldone, Honig, & Bryne, 2007; Sadeh, 2007). The current recommended sleep duration required for adolescents is between eight to ten hours of sleep per night in order for them to function at their very best (NSF, 2015).

Poor sleep quality among adolescents aged between 10-19 years old is becoming a major worldwide concern (Chung & Cheung, 2008). Adolescent can further be divided into 3 subgroups that is early adolescence group from 10 to 13 years old, mid adolescence aged from 14 to 15 years old and later adolescence from 16 to 19 years old (World Health Organization [WHO], 2015). The transition period from childhood to adolescents mostly happens during their schooling environment. It is during this transition period that changes will occur in the biological, physical and psychological aspects of adolescence (Ernst, Pine & Hardin, 2006; Blakemore, Burnett, & Dahl, 2010). This period is the point where adolescents suffer from increasing pressures' from school, family, social and even the environmental that which indirectly contribute towards the delay in sleep timing together with the change in the intrinsic regulation of both circadian and homeostatic processes causing poor sleep quality (Blakemore, Burnett, & Dahl, 2010; Jiang et al., 2015).

A meta-analysis in 2010 among secondary school adolescents has shown that Asian adolescents have shorter weekday sleep by 40 to 60 minutes as compared to adolescents in America and 60 to 120 minutes shorter weekday sleep compared to adolescents in Europe (Olds, Blunden, Petkov, & Forchino, 2010; Matricciani, Olds, & Petkov, 2012). Studies have also shown that adolescents at secondary school sleep approximately 1.5 hours longer on weekends as compared to weekdays (Li et al., 2010; Chen et al., 2014). Similarly in Turkey, a study reported adolescents at secondary schools slept 7.42 hours on average on school days as compared to non school days was 9.4 hours (Yilmaz, Kilincaslan, Aydin, & Kul, 2011). In Malaysia, there have been no studies done among adolescents at secondary school on sleep quality. However, there is one study reported among children at age group of 6 to 12 years old, found 41.5% of insufficient sleep per night with increasing age (Firouzi, Koon, Noor, & Sadeghilar, 2013).

Important risk factors associated with poor sleep quality among adolescents in secondary schools include socio-economic status of family (Gellis, 2011; Felden, Leite, Rebelatto, Andrade & Beltrame, 2015), educational background of parents (Felden, Leite, Rebelatto, Andrade & Beltrame, 2015) and family structure (Merikangas et al., 2010). Apart from that, inadequate amount of sleep among adolescent at secondary school has been associated with daytime sleepiness, poor performance at school (Bakotic, Radosevic, & Koscec, 2009). Psychological correlates such as stress, anxiety and depression (Steptoe, Peacey, & Wardle, 2006; Glozier et al., 2010; Xu et al., 2011) are the essential point that need to be taken into consideration as they give serious contribution to poor sleep quality among adolescents in secondary schools.

1.2 Problem Statements

The majority of children and adolescents in both developed and developing countries reported getting inadequate amount of sleep (Qidwai, Ishaque, Shah, & Rahim, 2010; Yim et al., 2014; Jiang et al., 2015). Currently, the sleep duration was found to decrease with age and highest prevalence of poor sleep quality was found to occur among older adolescents at secondary school. In Shanghai, a study among children and adolescents reported that the mean age of insufficient sleep begins at 11.5 years, females slept less and gets into bed late ($p < 0.001$) (Jiang et al., 2015). A meta-analysis study among adolescents at secondary school stated that sleep time was found to decline with age at an estimation of 14 minutes per day with per year of age on school days and 7 minutes per night with per year of age on non-schooling days (Olds, Blunden, Petkov & Forchino, 2010). Similarly, a study in China among adolescents at secondary school also reported the average sleep duration decreases with age, where among adolescents aged 10-15 years, the average sleep duration was (7.25 hours), among 16-20 year old it was 6.48 hours and among 21-25 year old it was 6.32 hours (Xu et al., 20

The prevalence of poor sleep quality among children and adolescents is high and varies from 10% to 40% worldwide (Chung & Cheung, 2008; Huang, Wang, & Guillemainault, 2010, Xu et al., 2011). In China a study by Xu et al. (2011) reported highest prevalence of poor sleep quality was found between age group of 16 to 20 year old which was 18.6%, followed by 21 to 25 year old was 17.1% and among 10 to 15 year old was 15.2%.

The National Institute of Mental Health [NIMH] 2009 in America reported that, half of all lifetime mental illness cases begins' by the age of 14. Adolescents are in between the period of constant physical and emotional growth. As such, poor sleep quality is associated with behavioral and emotional problems such as depression, anxiety, and stress (American Psychological Association [APA], 2014; Anxiety Depression Association of America [ADAA], 2015). Studies have also documented that the contributing factors of such psychiatric morbidities are reported as, academic workload and psychosocial concerns (Blakemore, Burnett, & Dahl, 2010; Guo et al., 2014). These psychological correlates are common among university

students (Sreenamareddy, Shankar, Mukhipadhyay, & Menezes, 2007; Sweileh, Ali, Sawalha, Abu, Zyoud, & Jabi, 2011; Waqas, Khan, Sharif, Khalid, & Ali, 2014). However, psychological correlated have also been highlighted among school students (Kaneita et al., 2009; Kaur et al., 2014).

In Asia, academic performance and pressure are strongly associated with sleep quality, especially among adolescents (Chung & Cheung, 2008; Dewald et al., 2015). It is at this age that adolescents are found to be highly pressurized by their parents for academic success in order to enter better universities. Homework time in secondary students has the potential to cause an adverse effect on sleep quality and highly prevalent among Asian children as compared to those in the West (Jiang et al., 2015).

Many studies on sleep quality have focused and received much attention on adults at the university levels as compared to those among secondary level school in worldwide. The prevalence of poor sleep quality among university students in other countries such as United Arab Emirates (UAE), Pakistani, Ethiopia, Austria, Hong Kong, Iran, Brazil and South Texas ranged between 30% and 60% (Huen, Chan, Yu, & Wing, 2007; Ghoreishi and Aghajani, 2008; Omar et al., 2013; Waqas, Khan, Sharif, Khalid, & Ali, 2014; Araujo et al., 2014). In Malaysia, research on sleep quality has widely focused on university students and the prevalence ranged between 30 and 67% (Zailinawati et al., 2009; Lai and Sai, 2013; Harlina et al., 2014). However to the best of our knowledge, there is no study on sleep quality found among adolescents at secondary schools in Malaysia. Therefore this study will be focusing on secondary level school students. Since, poor sleep quality among adolescents in worldwide have been highly reported, therefore, it is crucial to understand the prevalence and predictors of poor sleep quality among adolescents age 19 and younger in Malaysia. This will be useful to design successful and effective intervention strategies for this age group and it will be helpful to identify the extent of poor sleep quality among secondary level school students in Malaysia.

1.3 Significant of the Study

The result of this study will provide the prevalence and also give better understanding on factors associated with of poor sleep quality among secondary level school students. It will also identify how socio-demographic characteristics, psychological factors and academic performance predict development of poor sleep quality. The findings from this study will add new knowledge in the respective field and will provide useful information for the government or policy makers in terms of planning an intervention or a campaign targeting the secondary schools students by focusing on the significant predictors of poor sleep quality of this study. Hence, it will give a wake-up call for better health and well-being for the future generation.

1.4 Research questions

The research questions of this study are as follows:

- i. Is there significant association between poor sleep quality and socio-demographic characteristics (age, gender, ethnicity, religion, monthly income of family, parents' educational background and marital status of parents) of adolescents at secondary school?
- ii. Is there significant association between poor sleep quality and psychological factors (depression, anxiety and stress) among adolescents at secondary school?
- iii. Is there significant association between poor sleep quality and academic performance of adolescents at secondary school?
- iv. What are the predictors of poor sleep quality among adolescents at secondary school?

1.5 Study Objective

1.5.1 General Objective

To determine the prevalence and predictors of poor sleep quality among secondary level school students in Gombak, Selangor.

1.5.2 Specific Objectives

The specific objectives of this study are as follows:

- i. To determine the socio-demographic background (age, gender, ethnicity, family monthly income, parent's educational level, and marital status of parents), psychological factors (stress, depression, and anxiety) and academic performance among secondary level school students in Gombak, Selangor
- ii. To determine the prevalence of poor sleep quality among secondary level school students in Gombak, Selangor
- iii. To determine the association between socio-demographic background and poor sleep quality among secondary level school students in Gombak, Selangor
- iv. To determine the association between psychological factor (depression, anxiety and stress) and poor sleep quality among secondary level school students in Gombak District, Selangor
- v. To determine the association between academic performance and poor sleep quality among secondary level school students in Gombak District, Selangor
- vi. To determine the predictors of poor sleep quality among secondary level school students in Gombak District, Selangor.

1.6 Hypotheses

The alternate hypotheses are as follows:

- H_1 : There is a significant association between socio-demographic background (age, gender, ethnicity, family monthly income, parent's educational level, and marital status of parents) and poor sleep quality among secondary level school students in Gombak, Selangor.
- H_2 : There is a significant association between psychological factors (stress, depression and anxiety) and poor sleep quality among secondary level school students in Gombak, Selangor.
- H_3 : There is a significant association between academic performance and poor sleep quality among secondary level school students in Gombak, Selangor.

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