Depression and Health Risk Behaviors among Female Adolescents

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Objective: *To study the prevalence of depression and its association with health risk behaviors among female adolescents.*
Material and Method: *The present study was of population-based cross-sectional survey design. The sample population was female adolescents aged 15 to 24 years old living in Kukot Municipal area in Pathumthani Province (n = 1,035). Measurements were as follows: (1) exposure - depression was assessed with the Center for Epidemiology Studies-Depression scale (CES-D), and (2) outcome - health risk behaviors, including sexual risk behaviors and substance abuse/dependence (alcohol, tobacco and illicit drugs) were assessed by Alcohol Use Identification Test (AUDIT) and Diagnostic Interview Schedule (DIS). Multiple logistic regression was employed to determine associations between depression and health risk behaviors while controlling for confounding factors.*
Results: *The prevalence of depression in the sample was 17.49%. Nearly one fourth of the respondents (23.29%) reported having health risk behaviors. About 14% of the respondents had sexual risk behaviors and about 10% reported substance abuse/dependence. Depression was associated with an increased risk for any health risk behavior (OR = 1.73; 95% CI 1.16 to 2.59, $p<0.05$). Even after adjusting for confounding factors, the association remained significant (OR = 1.65; CI 1.11 to 2.45, $p<0.05$). Stratified analyses also showed that depression significantly increased the risk of such behaviors, particularly among those with single parents (OR = 3.46 95% CI 1.70 to 7.03).*
Conclusion: *Depression and health risk behaviors were common among female adolescents. Depression was independently associated with an increased risk of health risk behaviors. The risk was particularly predominant among those with single parents. The findings suggest that there is a need to develop health policy and service planning for identification and treatment of female adolescents at risk of common health risk behaviors.*

Keywords: *Depression, Health risk behaviors, Adolescents*

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Depression is among diseases of greatest burden worldwide, with a continuous increase in the number of affected individuals and the resulting huge losses such as suicide[1-3]. According to the World Health Report in 2001, the ranking of depression has risen from number 4 on the list of diseases of highest burden in 1990 to number 2 in the year 2000[4]. In the United Stated, the National Health and Nutrition Examination Survey (NHANES) on household population in the 2005 to 2006, using Patient Health Questionnaire-9 (PHQ-9), revealed that depression was found in 6.7% of females aged 12 years or older, compared to 4.0% of the male counterparts[5]. In Thailand, the Department of Mental Health conducted surveys using Mini International Neuropsychiatric Interview (MINI) and found that the prevalence of depression in the population increased from 140.55 to 185.98 per 100,000 people between 2005 and 2007[5]. Depression was also common in senior high school and vocational school students, with the prevalence among females being 19.0%, compared to 13.7% among male counterparts in the year 2004[6].

In many countries, health risk behaviors also contributes substantially to disease burden[7]. Thailand's Ministry of Public Health evaluated the Disability Adjusted Life Year (DALYs) in reference to risk factors among the Thais in 2004 and 2009, and found that sexual risk behaviors, cigarette smoking and alcohol drinking appeared to be among the most

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common risk factors[8]. A study among undergraduate students, using Center for Disease Control Youth Risk Behavior Questionnaire found that 32.6%, 5.8% and 4.5% of the female students reported alcohol drinking problem, smoking, and sexual risk behavior, respectively[9,10]. In Thailand, the National Statistic office indicated an increasing trend of alcohol drinking during 1996 to 2006 among Thai people of all ages and genders. The trend was particularly striking among females aged 15 to 19 years[10].

Previous Studies, mostly from the United Stated, have shown associations between depression and health risk behaviors, especially sexual risk behaviors and substance use. Some of the cross-sectional studies have shown that depression in adolescents is associated with having sexual intercourse at an early age, multiple sexual partners, unprotected sex, unplanned pregnancy and abortion[11-14]. Other cross-sectional studies in adolescents showed that depression was related to a variety of health risk behaviors, such as cigarette smoking, alcohol consumption and substance use[11,15-17]. On the other hand, a longitudinal study showed that health risk behaviors could predict later depression[18]. Another longitudinal study, however, suggested that depressive symptoms in teenagers aged 15 and 16 years were positively related to the teenagers' smoking status 9 years later[19].

In Thailand, no studies have been done to identify the association between depression and health risk behaviors in the community. Available evidence is from studies of either depression or health risk behaviors. All of them were conducted within school settings[6,9]. The aim of this study were: 1) to examine the prevalence of depression and health risk behaviors among female adolescents and, 2) to assess the relationship between depression and such behaviors.

Material and Method

Study design

Population-based, cross-sectional survey.

Sampling

The sample included 1,035 female residents aged 15 to 24 years old, living in Kukot Municipal area in Pathumthani. Only one female adolescent in each household was selected for interview. If the selected eligible person was not at home or available for interview at the first approach, substitution was not permitted. We ensured that repeated attempts were made on at least three occasions on different days to interview the selected person so as to reduce non-response.

Measures

The instrument had 2 parts, i.e. interviewer-administered and self-report questionnaires. The self-report questionnaire covered sensitive topics such as depressive symptoms, and histories of sexual risk behaviors and illicit drug use. All the instrument was pre-tested on 30 female adolescents aged 15 to 24, living in a nearby municipal area.

Variables

Independent variables

Depression was measured using the Center for Epidemiology Studies-Depression scale (CES-D). It is a standardized self-administered scale assessing depressive symptomatology designed for use with community populations[20]. Its 20 items correspond to depressive symptom items on Hamiton Rating Scale for Depression and Raskin Depression Rating Scale[21]. Each item is rated on a scale of 4, in terms of frequency of feeling occurrence during the past week. The total scores range from 0 to 60. The Thai version has a cut off score of 22. The scores of 22 or above indicate major depression, with 72% sensitivity and 85% specificity. Its Cronbach's coefficient alpha is 0.86[22].

Dependent variables

Health risk behaviors included two main categories namely, sexual risk behaviors and substance use. Sexual risk behaviors were measured using a self-administered questionnaire. Those who responded positively to one of the following items were regarded as having a history of sexual risk behaviors; having first sexual intercourse at an early age (16 years old or below), having sexual intercourse with more than one person in the past 12 months and having a history of abortion. These items were derived from previous studies[23,24]. Substance use/dependence in this study referred to cigarette use, hazardous and harmful alcohol drinking and illicit substance use. Hazardous and harmful drinking was measured using the Alcohol Use Disorders Identification Test (AUDIT)[25]. AUDIT is composed of 10 items and has a total scores of 40. Those with an AUDIT score of 8 or above is considered as having problem drinking. Cigarette and illicit drug use were measured using self-administered questionnaire, modified from the Diagnostic Interview Schedule (DIS)[26]. Those who reported a past one-year history of such substance use problem(s) were regarded as having substance use/dependence.

Potential confounder variables

Sociodemographic variables included age, education level of the respondent, educational level of the household head, marital status of parent, stressful life event. Socio-economic status (SES) was assessed by the number of household assets, including bed, refrigerator, electric kettle, television set, stereo, vcd/dvd player, rice cooker, mobile phone, iron/ironing service, microwave oven, air conditioning, computer, washing machine/laundry service, laptop computer, vacuum cleaner, car. The household asset index was created by using Principal Component Analysis (PCA)[27]. The method has been used previously in many developing countries as proxies to measure household socioeconomic status (or wealth), rather than monetary measures (such as income or expenditure)[28]. The index variable was treated as dichotomous: high and low SES status.

Data analysis

Statistical analyses were performed with STATA version 10.0[29]. In univariate analysis, we estimated the weighted percent and odds ratios for the association between depression, health risk behaviors and potential confounding factors. The statistical significance of any interaction between depression and a stratifying potential confounder variable in risk for the health risk behavior outcome was tested for using a likelihood ratio test. Multiple logistic regression was used to determine associations between depression and health risk behaviors while controlling for potential confounders.

The study was approved by the Ethics Committee of Thammasat University Faculty of Medicine.

Results

Descriptive analyses

All the addresses in the selected catchment areas of Kukot Municipality were approached to identify private households with at least one eligible female aged 15 to 24 years old. A total of 1,083 households contained at least one eligible resident. Of those eligible persons selected (n = 1,083), 3.9% could not be contacted (n = 43) and a further 0.5% refused to participate (n = 5), leaving 1,035 successfully completed interviews. The overall response rate was, therefore, 95.6%.

The sample had a mean age of 19.5 years (SD = 3.02). Most of the respondents (72.5%) were single, 26.2% were married and 1.3% were widowed or divorced or separated. Just over half of the respondents (51.0%) attained junior secondary school certificate (Mathayom 3) or less. More than two-thirds of the respondents' parents (70.3%) were married and 29.7% were widowed, divorced or separated. More than half of the household heads (53.3%) had completed primary school level (Prathom 6) or above. About half of respondents had household assets greater than 8 items. About half of the respondents reported experiencing one or more stressful life event over the past year.

About 17% of the sample were classified as having depression on the CES-D. The mean score was 13.7 (SD = 7.91, Min = 0, Max = 49).

Nearly one fourth of the respondents 219 (23.3%) reported having health risk behaviors. About 14% reported some kind of sexual risk behaviors. It was found that 9.9% of respondents had first sexual intercourse at an early age (16 years old or below), 0.5% had sexual intercourse with more than one partners, 0.5% had sexual intercourse with person(s) other than their partners, 2.7% had more than one partner in the past 12 months and 1.9% had had illegal abortion. About 10% had been using or abusing substance of some kind -3.9% smoked everyday, 3.2% reported hazardous and harmful alcohol drinking and 2.3% reported using illicit substance.

Univariate analyses

Depression was associated with an increased risk for any health risk behavior (OR = 1.7; 95% CI 1.2 to 2.6, $p<0.05$).

The study findings showed that poor education and low socio-economic status of the respondents were associated with health risk behavior (OR = 1.3, CI = 1.1 to 1.82; OR = 1.47, CI = 1.03 to 2.09, $p<0.05$). The association between demographic characteristics and Depression were shown in Table 1.

Low socio-economic status was associated with health risk behavior (OR = 1.41; CI = 1.01 to 1.97, $p<0.05$). The association between demographic characteristics and health risk behaviors were shown in Table 2.

Stratified analyses

The statistical significance of interactions between depression and stratifying potential confounder variables were tested for using a likelihood ratio test. The results revealed that the association between depression and any health risk behavior was significantly stronger among those with single parents (i.e. parents of widowed/divorced/separated marital

Table 1. Associations between demographic characteristics and depression

Variables	n = 1,035	Depression		
		n (weighted, %)	OR (95% CI)	*p*-value
Age				
15 to 19 year	562	91 (8.85)	1	
20 to 24 year	473	89 (8.63)	0.86 (0.68 to 1.22)	0.414
Marital status				
Single/widowed/divorced/separated	780	142 (13.47)	1	
Married	255	38 (4.02)	1.33 (0.87 to 2.02)	0.175
Education				
High school or more	509	72 (7.14)	1	
Junior high school or less	526	108 (10.34)	1.33 (1.10 to 1.82)	0.028*
Marital status of parents				
Married	732	125 (11.68)	1	
Widowed/divorced/separated	303	55 (5.80)	1.22 (0.82 to 1.79)	0.312
Education of household head				
Above primary school	482	79 (7.89)	1	
Uneducated to primary school	553	101 (9.60)	0.88 (0.61 to 1.25)	0.484
Socio-economic status (asset-index)				
High status	516	76 (7.37)	1	
Low status	519	104 (10.12)	1.47 (1.03 to 2.09)	0.033*
Number of stressful life events				
Score 0	514	82 (8.33)	1	
Score ≥1	521	98 (9.15)	1.11 (0.78 to 1.58)	0.553

* *p*-value <0.05

status) (OR = 3.46 95% CI 1.70 to 7.03, LR statistics = 7.41, *p*-value = 0.006). The associations between depression and any health risk behavior, stratified by potential confounders were shown in Table 3.

Multivariate analyses

Depression was associated with health risk behavior among female adolescents. After adjusting for confounding factors, the association between depression and health risk behavior, remained significant ($p<0.05$). The results were shown in Table 4.

Discussion

To our knowledge, this is the first community study to examine the prevalence of common health risk behaviours, namely sexual risk behaviours, hazardous and harmful drinking, smoking and illicit drug use and their association with depression among young Thai females. The results showed that depression and health risk behaviors were common among female adolescents. The prevalence of depression in this study was in accordance with that reported by Boonyamalik et al[6], who investigated depression in a sample of 12,933 students in senior high schools and vocational colleges using CES-D. They found that 19.00% of the female students had depression. A study by Shrier[17] in the US surveyed 6,583 adolescents, also using CES-D, and found that 15% of the female adolescents had depression. A study by Rubin et al[12] among 572 female adolescents, using CES-D, found the prevalence of depression to be 13.7%. The prevalence figures in these studies are quite similar, although slight differences in the figures may have resulted from the differences in samples' age range, and cut-off point of CES-D.

This study also support previous findings on the association between depression and health risk behaviors among female adolescents. For example, Rubin et al[12], also assessing depressive symptoms using the CES-D, found that a high level of depressive symptoms was associated with higher risk of having had sexual intercourse (adjusted OR = 2.29; CI = 1.18 to 4.43). Fergusson et al[30] examined the associations between alcohol abuse or dependence and major depression in a sample of 1,055 participants found associations between alcohol abuse or dependence and major depression in different age groups: 17 to 18

Table 2. Associations between demographic characteristics and health risk behavior

Variables	n = 1,007	Health risk behavior		
		n (weighted, %)	OR (95% CI)	*p*-value
Age				
15 to 19 year	549	123 (12.70)	1	
20 to 24 year	458	96 (10.56)	1.04 (0.74 to 1.45)	0.800
Marital status				
Single/widowed/divorced/separated	761	159 (15.99)	1	
Married	246	60 (7.27)	0.78 (0.53 to 1.13)	0.194
Education				
High school or more	501	108 (11.48)	1	
Junior high school or less	506	111 (11.78)	0.98 (0.70 to 1.36)	0.923
Marital status of parents				
Married	715	157 (16.37)	1	
Widowed/divorced/separated	292	62 (6.89)	1.01 (0.69 to 1.45)	0.960
Education of household head				
Above primary school	467	104 (11.71)	1	
Uneducated to primary school	540	115 (11.55)	1.15 (0.83 to 1.61)	0.383
Socio-economic status (asset-index)				
High status	496	94 (9.95)	1	
Low status	511	125 (13.31)	1.41 (1.01 to 1.97)	0.039*
Number of stressful life events				
Score 0	498	106 (11.71)	1	
Score ≥1	509	113 (11.55)	0.95 (0.68 to 1.32)	0.780

* *p*-value <0.05

years old (OR = 2.15; CI = 1.50 to 3.08) and 20 to 21 years old (OR = 1.87; CI = 1.31 to 2.66). On the other hanbd, Breslau et al[31] found that major depression at baseline significantly increased the risk for progression to daily smoking (OR = 3.0: CI = 1.1 to 8.2). A previous study[32] in a population-based sample of woman found smoking was associated with increased risk for major depressive disorder (OR = 1.46: CI = 1.03 to 2.07).

This study found that the marital status of parents modified the relationship between the depression and the health risk behavior. The risk for unhealthy behaviours was particularly predominant among young depressed females from single parent families. The interaction found in this study was interesting and has not been reported by previous studies. This heightened risk may be explained by the stress/social support model[33]. Young depressed females with inadequate social support from single parents may not cope as well with stressful life events as those with adequate support from both parents. They are therefore more likely to turn to deviant peers and pick up risky behaviors so as to gain more immediate support and acceptance.

Several potential limitations need to considered when interpreting the results of this study. The major limitation was that the study was of cross-sectional survey design, so we cannot infer causality. The data can only demonstrate association between depression and the health risk behaviour. An additional limitation is that the data were based on self-report, retrospective measures of certain sensitive issues, which are often subject to underreporting and recall bias. This cannot be assumed to accurately reflect all those in the study population who actually have such health risk behaviours. Future studies with prospective cohort design would help to disentangle this ambiguity of causal direction. Future research should also address dimensions of social support from family and friends, as they may have a role in explaining the increased risk among young depressed females, particularly those from single parent families.

Implications

The findings highlights the need for parents, guidance counselors, psychologists and those who interact with female adolescents to be recognize factors

Table 3. Odd ratios for the associations between depression and any health risk behavior, stratified by potential confounders

Stratification variable	OR (95% CI)	Adjusted OR (95% CI)	LR test for interaction	*p*-value
Age				
15 to 19 year	1.86 (1.07 to 3.23)	1.74 (1.16 to 2.59)	0.18	0.670
20 to 24 year	1.60 (0.89 to 2.87)			
Marital status				
Married	2.01 (1.27 to 3.17)	1.76 (1.18 to 2.64)	1.54	0.214
Single/widowed/divorced/separated	1.18 (0.51 to 2.71)			
Education				
High school or more	1.87 (1.01 to 3.46)	1.73 (1.16 to 2.59)	0.14	0.708
Junior high school or less	1.63 (0.96 to 2.78)			
Marital status of parents				
Married	1.21 (0.74 to 1.95)	1.78 (1.18 to 2.58)	7.41	0.006*
Widowed/divorced/separated	3.46 (1.70 to 7.03)			
Education of household head				
Above primary school	1.98 (1.17 to 3.35)	1.74 (1.17 to 2.60)	0.58	0.448
Uneducated to primary school	1.50 (0.81 to 2.78)			
Socio-economic status (asset-index)				
High status	1.23 (0.61 to 2.48)	1.66 (1.11 to 2.47)	1.40	0.236
Low status	1.95 (1.18 to 3.24)			
Number of stressful life events				
Score 0	1.77 (0.98 to 3.17)	1.73 (1.16 to 2.58)	0.01	0.918
Score ≥1	1.70 (0.98 to 2.95)			

Crude OR (95%) = 1.73 (1.16 to 2.58)
* *p*-value <0.05

Table 4. Odds ratios for the associations between depressive symptoms and health risk behavior, after adjustment for confounding factors

	n	Health risk behavior				
		n (weighted, %)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)[a]	Adjusted OR (95% CI)[b]	Adjusted OR (95% CI)[C]
Depression						
Non-depression	830	165 (17.60)	1	1	1	1
Depression	177	54 (5.66)	1.73 (1.16 to 2.59)	1.78 (1.18 to 2.58)	1.66 (1.11 to 2.47)	1.65 (1.11 to 2.45)

[a] Adjusted for marital status of parents; [b] Adjusted for socio-economic status; [c] Adjusted for marital status of parents and socio-economic status

contributing to common health risk behaviors among young females. The findings also have important implications for health policy and service planning development in order to identify and protect the young females at risk.

Conclusion

Depression and health risk behaviors were common among female adolescents. Depression was independently associated with an increased risk of health risk behaviors, particularly among those with single parents.

What is already known on this topic?

Evidence in western countries suggested that depression and health risk behaviors are prevalent and

may be related. Whether such findings apply to Thai female adolescents remained unknown.

What this study adds?

Depression and health risk behaviors are common among female adolescents.

Depression is independently associated with an increased risk of health risk behaviors.

The risk is particularly prominent among those with single parents.

Potential conflicts of interest

None.

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ภาวะซึมเศร้าและพฤติกรรมเสี่ยงต่อสุขภาพของวัยรุ่นหญิง

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วัตถุประสงค์: เพื่อศึกษาความชุกของภาวะซึมเศร้าและความสัมพันธ์กับพฤติกรรมเสี่ยงต่อสุขภาพของวัยรุ่นหญิง

วัสดุและวิธีการ: การศึกษานี้เป็นการสำรวจ ณ จุดเวลาใดเวลาหนึ่ง โดยมีประชากรกลุ่มตัวอย่างคือวัยรุ่นหญิงอายุระหว่าง 15 ถึง 24 ปี ในเขตเทศบาลคูคต จังหวัดปทุมธานี จำนวนทั้งสิ้น 1,035 คน โดยใช้เครื่องมือแบบวัดภาวะซึมเศร้า (CES-D) แบบประเมินพฤติกรรมเสี่ยงต่อสุขภาพ 2 ด้าน คือ พฤติกรรมเสี่ยงด้านเพศสัมพันธ์และพฤติกรรมการใช้สารเสพติด ได้แก่ การดื่มแอลกอฮอล์ การสูบบุหรี่และการใช้สารเสพติด ซึ่งเป็นแบบสอบถามแบบให้ตอบด้วยตนเองประกอบด้วย Alcohol Use Disorder Identification Test (AUDIT) สำหรับคัดกรองปัญหาการดื่มสุรา และแบบสัมภาษณ์เพื่อใช้ในคัดกรองการสูบบุหรี่และการใช้สารเสพติดที่ผิดกฎหมายโดยเครื่องมี Diagnostic Interview Schedule (DIS) สถิติที่ใช้ในการวิเคราะห์เพื่อหาความสัมพันธ์ระหว่างภาวะซึมเศร้าและพฤติกรรมเสี่ยงต่อสุขภาพโดยควบคุมปัจจัยกวน คือ Multiple logistic regression

ผลการศึกษา: กลุ่มตัวอย่างมีความชุกของภาวะซึมเศร้าร้อยละ 17.49 เกือบหนึ่งในสี่ของผู้ตอบแบบสอบถามมีพฤติกรรมเสี่ยงต่อสุขภาพคิดเป็นร้อยละ 23.29 โดยมีพฤติกรรมเสี่ยงทางเพศร้อยละ 14 และพฤติกรรมเสี่ยงของการใช้สารเสพติดร้อยละ 10 ภาวะซึมเศร้ามีความสัมพันธ์กับพฤติกรรมเสี่ยงต่อสุขภาพ คือ วัยรุ่นหญิงที่มีภาวะซึมเศร้ามีโอกาสเกิดพฤติกรรมเสี่ยงต่อสุขภาพมากกว่าผู้ที่ไม่มีภาวะซึมเศร้า 1.73 เท่า (OR = 1.73; CI 1.16 ถึง 2.59, p<0.05) เมื่อควบคุมปัจจัยกวนพบความสัมพันธ์ดังกล่าวมีเท่ากับ 1.65 เท่า (OR = 1.65; CI 1.11 ถึง 2.45, p<0.05) โดยเมื่อนำข้อมูลมาวิเคราะห์แบบ Stratified analyses แสดงให้เห็นว่ากลุ่มตัวอย่างที่มีภาวะซึมเศร้าและอยู่ในครอบครัวบิดามารดาหย่าร้าง แยกกันอยู่ หรือเป็นหม้ายจะมีโอกาสเกิดพฤติกรรมเสี่ยงต่อสุขภาพมากกว่ากลุ่มที่ไม่มีภาวะซึมเศร้าเป็น 3.46 เท่า (LR test 7.41, OR = 3.46)

สรุป: ภาวะซึมเศร้าและพฤติกรรมเสี่ยงต่อสุขภาพพบในในกลุ่มวัยรุ่นหญิง โดยภาวะซึมเศร้ามีความสัมพันธ์กับการเพิ่มพฤติกรรมเสี่ยงต่อสุขภาพ ซึ่งผลการศึกษาในครั้งนี้สามารถนำไปใช้ในการวางนโยบายสุขภาพ และนำไปใช้ในการวางแผนให้บริการและการรักษากลุ่มวัยรุ่นหญิงที่มีพฤติกรรมเสี่ยงต่อสุขภาพได้