

A comparison study of perceived stress and quality of life among Master of Pharmacy and non-pharmacy master's students

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Abstract

Background: Postgraduate students often live with an excessive amount of stress, which can have negative academic, emotional and health-related outcomes.

Aim: To examine perceived stress and health-related quality of life (HRQOL) among Master of Pharmacy (MPharm) students compared to non-pharmacy master's students (Non-MPharm).

Method: The Perceived Stress Scale (PSS), SF-12v2 survey and a questionnaire instruments were used to measure stress, HRQOL and factors that MPharm students believed produced and alleviated stress, respectively.

Results: One hundred percent of MPharm students (n=26) and 88% of Non-MPharm students (n=100) participated in this study. The mean PSS scores were insignificantly different between the MPharm students and Non-MPharm students. Negative correlations were found between stress and mental and physical HRQOL in MPharm students. However, only negative correlation between stress and mental HRQOL in Non-MPharm students.

Conclusion: MPharm students reported relatively lower levels of stress and mental HRQOL than Non-MPharm students did.

Keywords: *Mental, physical, postgraduate students, stress*

Introduction

Stress among postgraduate students has been a topic of interest for many years. Stress has been defined simply as "the strain that accompanies a demand perceived to be either challenging (positive) or threatening (negative) and, depending on the appraisal, either adaptive or debilitating" (Sanders & Lushington, 2002). Populations undergoing a developmental transition are thought to be particularly exposed to the occurrence and effects of stressful processes (L. Cohen, Burt & Bjorck, 1987). University students often live with an excessive amount of stress, which can have negative academic, emotional and health-related outcomes (Beck, Hackett, Srivastava, McKim & Rockwell, 1997). In general, students experience high stress levels at predictable times each semester due to their academic commitments, financial pressure and a lack of time management skills. In fact, stress can affect both students' health and academic performance when it is perceived negatively or becomes excessive (Campbell, Svenson & Jarvis, 1992; Misra, McKean, West, & Russo, 2000). Feelings

of uncertainty about being in the appropriate academic program, worries about relations with faculty members/advisors and concerns about the time required to achieve one's degree are some of the areas which can constitute stressful experiences which occur during graduate school (Konduri, Gupchup, Borrego & Worley-Louis, 2006). Stressful academic events and other stressful life events may negatively affect one's health-related quality of life (HRQOL) in the physical and mental domains of life. College students who reported experiencing stressful life events also reported worse HRQOL (Damush, Hays & DiMatteo, 1997).

In the literature, it has been noted that the majority of studies on stress have been conducted with medical, dental or nursing students (Beck & Srivastava, 1991; Heins, Fahey & Leiden, 1984; Pau *et al.*, 2007). Over 600 articles were published between the years 1966 and 1999 which all related to stress in medical education (Shapiro, Shapiro & Schwartz, 2000). On the other hand, very few studies on stress have examined the sources or levels of stress experienced by pharmacy students compared with other students (Frick, Frick, Coffman & Dey,

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2011; Gupchup, Borrego & Konduri, 2004; Henning, Ey & Shaw, 1998; Marshall, Allison, Nykamp & Lanke, 2008). In one study in 1998, it was found that pharmacy students were more stressed than medical and dental students (Henning *et al.*, 1998).

Many stress scales have been developed and used for studying stress among college students (Misra *et al.*, 2000; Sanders & Lushington, 2002; Towbes & Cohen, 1996). Previously developed and validated stress instruments have also been used to assess stress among Bachelor and Doctor of Pharmacy students (Frick *et al.*, 2011; Gupchup *et al.*, 2004; Henning *et al.*, 1998; Marshall *et al.*, 2008). However, the Perceived Stress Scale (PSS) is the most widely used psychological instrument for measuring perceptions of stress, and it has been correlated with several psychological and physiological scales (Chang, 1998; Cohen, 1988; Cohen, Kamarck & Mermelstein, 1983; Ebrecht *et al.*, 2004; Hall, Chipperfield, Perry, Ruthig & Goetz, 2006; Otto *et al.*, 1997).

The objectives of this study were to: (1) examine the perceived stress levels and HRQOL of Master of Pharmacy (MPharm) students and non-pharmacy master's students and socio-demographic subsets of these two samples through coursework or mixed mood at Universiti Sains Malaysia (USM); (2) compare the stress levels and HRQOL of MPharm students with non-pharmacy master's students at Universiti Sains Malaysia (USM) through coursework or mixed mode; (3) investigate the relationship between the perceived stress levels and HRQOL of the samples; and (4) investigate the sources of stress, strategies for coping with stress and suggestions for how to ameliorate stress among MPharm students.

Methods

A cross-sectional study was used. The PSS was used to measure stress, together with the SF-12v2 questionnaire for measuring HRQOL. MPharm and non-pharmacy master's students (through coursework and mixed mode) from seven different schools (School of Housing; Building and Planning; School of Computer Sciences; School of Social Sciences; School of Management; School of Mathematical Sciences; School of Chemical Sciences and Advanced Medical and Dental Institute) at Universiti Sains Malaysia were invited to participate in the study during the second semester of June 2009. Their responses were anonymous. This study was approved by our institutional review board.

The PSS is the most widely used instrument for measuring perceptions of stress. In this study, this scale was used because of its established validity and reliability (Cohen, 1988; Cohen *et al.*, 1983; Mimura & Griffiths, 2004; Remor, 2006). The PSS includes 14 questions, and the participants provided answers for each item on a five-point Likert scale. The PSS also assesses perceived stressful experiences and responses to stress over the previous month. Questions that ask about negative events or responses are scored in the reverse direction. The PSS generates a score between 0 and 56. Higher scores reflect higher levels of perceived stress (Cohen *et al.*, 1983).

Quality of life was measured using the SF-12v2 HRQOL survey [Quality Metric Incorporated, Lincoln, Rhode Island]

(Ware, Kosinski, Turner-Bowker & Gandek, 2002; Ware Jr, Kosinski & Keller, 1996). The SF-12 and the SF-36 are the HRQOL instruments that are most commonly used to measure quality of life in clinical practice or research when studying HRQOL (Konduri *et al.*, 2006; Ware *et al.*, 2002; Ware Jr, 2000; Ware Jr *et al.*, 1996). The SF-12v2 instrument was used to assess HRQOL through the use of 12 questions, answered using a Likert scale. The 12 questions on the SF-12 are divided into a mental health component summary (MCS) and physical health component summary (PCS) (Ware Jr. *et al.*, 1996).

A questionnaire was also used to collect the demographic and social characteristics of the MPharm and non-pharmacy master's students. Through free writing, the MPharm students were asked to write down their most common stress stimulus and their strategies for dealing with and reducing stress, as well as their suggestions for administrative changes or changes to the campus that they thought might reduce their stress levels.

Data analyses were performed using Microsoft Excel, the Quality Metric Health Outcomes Scoring Software 2.0 (Quality Metric Incorporated, Lincoln, RI) and SPSS version 15.0. In addition, SPSS was used to perform the Mann-Whitney test in order to examine the variations in individual PSS scores and individual SF-12 MCS and PCS scores according to the program of study, sex, age, nationality, exercise habits, length of daily commute, alcohol use and tobacco use. SPSS was also used to estimate Spearman's correlation coefficients for the correlations between the results of the PSS and the SF-12 MCS and PCS. The level of significance was 0.05.

Results

All of the MPharm students ($n = 26$) and 100 out of 114 non-pharmacy master's students from seven different schools at Universiti Sains Malaysia voluntarily completed the survey (response rates of 100% and 87.7% respectively). The socio-demographic characteristics and descriptive results of the PSS and SF-12 surveys for MPharm and non-pharmacy master's students are included in Tables I and II. In this study, 17 (65.4%) of MPharm students were female, while 51 (51%) of non-pharmacy master's student were female. Seven (26.9%) of the MPharm students reported taking regular exercise, while 36 (36%) of the non-pharmacy master's students reported getting regular exercise. The mean MCS score of the MPharm students was 39.0154 (SD 10.7), and 42.13 (SD 10.1) for non-pharmacy master's students.

The MPharm and non-pharmacy master's students' response frequencies for the 14-item PSS survey are presented in Table III. Seventeen MPharm students (65.4%) reported having felt nervous or stressed fairly often or very often in the previous month, while 19 (73%) of the MPharm students reported feeling confident about their ability to handle their personal problems (Table III). On the other hand, 51 (51%) of non-pharmacy master's students reported having felt nervous or stressed fairly often or very often in the previous month, while 55 (55%) of the students reported feeling confident about their ability to handle their personal problems (Table III).

Table I: Socio-demographic characteristics of MPharm students (n=26) and non-pharmacy master students (n=100)

Variable	NO. (%)	
	MPharm	Non-Pharmacy
Gender		
Male	9 (34.6)	49 (49)
Female	17 (65.4)	51 (51)
Age		
< 30 years	14 (53.8)	67 (67)
> 30 years	12 (46.2)	32 (32)
Marital status		
Single	17 (65.4)	66 (66)
Married	9 (34.5)	34 (34)
Nationality		
Malaysian	17 (65.4)	61 (61)
Foreigners	9 (34.6)	39 (39)
Smokes cigarettes		
Yes	2 (7.7)	4 (4)
No	24 (92.3)	95 (96)
Consumed alcoholic beverages within last month		
Yes	1 (3.8)	7 (7)
No	25 (96.2)	93 (93)
Regular exercise		
Yes	7 (26.9)	36 (36)
No	19 (73.1)	64 (64)
Average daily commute from residence to school		
< 30 minutes	20 (76.9)	67 (67)
> 30 minutes	6 (23.1)	33 (33)

This study discovered that smoking cigarettes was the only independent variable for which the difference in the PSS scores for MPharm students was significant ($p < 0.037$). The smoker subset reported significantly higher levels of perceived stress than those experienced by the non-smoker subset. There were no significant differences in the PSS scores of MPharm students based on sex, age, marital status, nationality, alcohol use, exercise habits and average daily commute from residence to school. For the non-pharmacy master's students, smoking cigarettes and age were the only independent variables for which the difference in the PSS scores was significant ($p < 0.05$). The smoker subset reported significantly higher levels of perceived stress than those experienced by the non-smoker subset. On the other hand, the under-30 subset reported significantly higher levels of perceived stress than those experienced by the subset aged over 30 years old.

The results of a comparison of the independent variables with the difference in the PCS scores for MPharm students showed that exercise habits and marital status were the only independent variables for which the difference in the PCS scores was significant ($p < 0.05$). The subset who took regular exercise reported significantly higher PCS scores than those who did not get regular exercise. The single subset reported significantly higher PCS scores than those who were married, while for the non-pharmacy master's students, there were no significant differences in the PCS scores based on subset analyses.

There were no significant differences in the MCS scores of the MPharm students based on subset analyses. Age was the only independent variable for which the difference in MCS scores was significant ($p < 0.05$) among non-pharmacy master's students. Those who were above 30 years old reported significantly better mental health. In fact, the mean PSS scores of the MPharm students were not significantly lower ($p > 0.05$) than the mean PSS scores of non-pharmacy master's students from seven different schools.

Table II: Perceived Stress and Health-Related Quality of Life issues among MPharm students (n=26) and non-pharmacy master students (n=100)

	Perceived Stress Scale (PSS) ^a		SF-12 HRQOL v.2 ^b Physical Component Summary (PCS)		SF-12 HRQOL v.2 ^b Mental Component Summary (MCS)	
	MPharm	Non-Pharmacy	MPharm	Non-Pharmacy	MPharm	Non-Pharmacy
N						
Valid	26	100	26	99	26	99
Missing	0	0	0	1	0	1
Mean(SD)	25.65 (7.5)	26.95 (5.8)	50.1615 (6.7)	47.69 (7.4)	39.0154 (10.7)	42.13 (10.1)
Median	25.50	27	51.9000	47.2	39.3000	41.4
Mode	24 ^c	26	52.50	41.40 ^c	18.20 ^c	39.10 ^c
Range	10-41	11.00-48.00	36.00-60.30	33.80-61.50	18.20-58.30	22.80-70.00

^aCohen S. PSS (English; 14 Items), Dr. Cohen's Scales, Laboratory for the Study of Stress, Immunity and Disease. Available at <http://www.psy.cmu.edu/~scohen/>. Accessed July 21, 2009

^bWare JE, Kosinski M, Turner-Bowker DM, Gandek B. User's Manual for the SF-12v2[®] Health Survey With a Supplement Documenting SF-12[®] Health Survey. Lincoln, RI: QualityMetric Incorporated; 2002.

^c Multiple modes exist. The smallest value is shown

Table III: MPharm students (n=26) and non-pharmacy master students (n=100) responses to the Perceived Stress Scale^a

Statement	Never, No. (%)		Almost Never, No.(%)		Sometimes, No. (%)		Fairly Often, No. (%)		Very Often, No. (%)	
	MPharm	Non-Pharmacy	MPharm	Non-Pharmacy	MPharm	Non-Pharmacy	MPharm	Non-Pharmacy	MPharm	Non-Pharmacy
In the last month, how often have you been upset because of something that happened unexpectedly?	1 (3.8)	4 (4)	1 (3.8)	10 (10)	19 (73.1)	50 (50)	4 (15.4)	23 (23)	1 (3.8)	13 (13)
In the last month, how often have you felt that you were unable to control the important things in your life?	2 (7.7)	4 (4)	5 (19.2)	22 (22)	12 (46.2)	49 (49)	5 (19.2)	18 (18)	2 (7.7)	7 (7)
In the last month, how often have you felt nervous and “stressed”?	1 (3.8)	4 (4)	1 (3.8)	11 (11)	7 (26.9)	34 (34)	11 (42.3)	34 (34)	6 (23.1)	17 (17)
In the last month, how often have you dealt successfully with day to day problems and annoyances?	0	2 (2)	0	6 (6)	9 (34.6)	42 (42)	14 (53.8)	38 (38)	3 (11.5)	12 (12)
In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?	1 (3.8)	4 (4)	1 (3.8)	4 (4)	9 (34.6)	50 (50)	11 (42.3)	29 (29)	4 (15.4)	13 (13)
In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1 (1)	2 (7.7)	4 (4)	5 (19.2)	40 (40)	14 (53.8)	39 (39)	5 (19.2)	16 (16)
In the last month, how often have you felt that things were going your way?	1 (3.8)	3 (3)	2 (7.7)	7 (7)	12 (46.2)	46 (46)	7 (26.9)	33 (33)	4 (15.4)	11 (11)
In the last month, how often have you found that you could not cope with all the things that you had to do?	1 (3.8)	5 (5)	7 (26.9)	22 (22)	11 (42.3)	53 (53)	6 (23.1)	16 (16)	1 (3.8)	4 (4)
In the last month, how often have you been able to control irritations in your life?	0	4 (4)	3 (11.5)	10 (10)	11 (42.3)	52 (52)	9 (34.6)	31 (31)	3 (11.5)	3 (3)
In the last month, how often have you felt that you were on top of things?	0	3 (3)	6 (23.1)	11 (11)	10 (38.5)	56 (56)	7 (26.9)	25 (25)	3 (11.5)	5 (5)
In the last month, how often have you been angered because of things that happened that were outside of your control?	0	4 (4)	8 (30.8)	22 (22)	11 (42.3)	51 (51)	7 (26.9)	14 (14)	0	9 (9)
In the last month, how often have you found yourself thinking about things that you have to accomplish?	0	2 (2)	1 (23.1)	3 (3)	6 (23.1)	29 (29)	13 (50)	33 (33)	0	33 (33)
In the last month, how often have you been able to control the way you spend your time?	0	4 (4)	3 (11.5)	10 (10)	9 (34.6)	36 (36)	9 (34.6)	39 (39)	5 (19.2)	11 (11)
In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	3 (11.5)	3 (3)	2 (7.7)	18 (18)	16 (61.5)	54 (54)	4 (15.4)	17 (17)	1 (3.8)	8 (8)

^aCohen S. PSS (English; 14 Items), Dr. Cohen's Scales, Laboratory for the Study of Stress, Immunity and Disease. Available at: <http://www.psy.cmu.edu/~scohen/>. Accessed July 21, 2009

The results of the SF-12v2 HRQOL for MPharm and non-pharmacy master's students are presented in Table II. The mean of the physical health scores of the MPharm students was not significantly higher ($p > 0.05$) than the mean score of the non-pharmacy master's students. Furthermore, the mean of the mental health scores of the MPharm students was not significantly lower ($p > 0.05$) than the mean of the non-pharmacy master's students from seven different schools.

This study also examined the possible correlation between perceptions of stress and HRQOL among MPharm students. There was a significant negative correlation between the results of the PSS and the SF-12 MCS ($p < 0.001$; Spearman's rank correlation test = -0.698). There was also a significant negative correlation between the results of the PSS and the PCS ($p < 0.01$; Spearman's rank correlation test = -0.569). However, for non-pharmacy master's students, there was a significant negative correlation between the results of the PSS

and the MCS ($p = 0.001$; Spearman's rank correlation test = -0.596). However, the correlation between the results of the PSS and the PCS was not significant ($p > 0.05$; Spearman's rank correlation test = -0.052).

The most common self-reported stress triggers, the effective strategies used by MPharm students for coping with stress and their suggestions for alleviating stress are presented in Table IV. The most common stress trigger was examinations ($n = 22$, 84.6%), while the most frequently reported strategy for coping effectively with stress was spending time with family and friends ($n = 17$, 65.38%). In addition, the most common self-reported suggestion for alleviating stress was to extend the period of study to 1.5 or two years ($n = 8$, 30.76%).

Table IV: Most common stress triggers, stress coping strategies and suggestion of MPharm students^a

Questionnaire Item	No. (%) ^b
Stress triggers	
Examinations	22 (84.6)
Case presentations	12 (46.15)
Clerkships reports	4 (15.38)
Financial concerns	3 (11.53)
Stress coping strategies	
Spending time with family and friends	17 (65.38)
Watching TV	11 (42.30)
Napping/sleeping	9 (34.61)
Exercising	7 (26.90)
Suggestions for administrative changes in the MPharm program	
Extend the period of study to 1.5-2 years	8 (30.76)
Make some changes in the program order	6 (23.07)

^aMPharm students ($n=26$) were asked to list their most common stress triggers, stress coping strategies and suggestions for administrative changes in the MPharm program to reduce stress

^bMPharm students who reported these items as one of their most common stress triggers, stress coping strategies and suggestions for administrative changes in the MPharm program to reduce stress

Discussion

The lives of students and healthcare professionals are often stressful. Different stress levels have been reported to occur in the lives of pharmacists (Barnett & Hopkins 1986; Lapane & Hughes 2006; Wolfgang, Perri 3rd & Wolfgang, 1988). This study examined the stress levels and quality of life of MPharm and non-pharmacy master's students at one point during the academic year. The PSS was used because of its applicability to a variety of research and subject types (Chang, 1998; Cohen, 1988; Cohen *et al.*, 1983; Ebrecht *et al.*, 2004; Hall *et al.*, 2006; Mimura & Griffiths, 2004; Otto *et al.*, 1997; Remor, 2006).

In fact, this study found a negative correlation between perceived stress levels and mental health among MPharm students and non-pharmacy master's students. These results are consistent with those of other studies (Damush *et al.*, 1997; Gupchup *et al.*, 2004; Hudd *et al.*, 2000; Marshall *et al.*, 2008).

A study conducted by Damush *et al.* showed that stressful life events were related to poor mental health among college students (Damush *et al.*, 1997). Another study by Hudd *et al.* found that higher stress levels were related to lower levels of self-esteem and reduced perceptions of health status among college students (Hudd *et al.*, 2000). Two other studies conducted with Doctor of Pharmacy (PharmD) students that examined the effects of stress on HRQOL showed that higher levels of stress among PharmD students were negatively correlated with mental HRQOL (Gupchup *et al.*, 2004; Marshall *et al.*, 2008).

In addition, there was also a negative correlation between perceived stress levels and the physical component of HRQOL among MPharm students, but to a lesser extent than the mental component. These results are, however, not consistent with the results of other studies conducted on PharmD students that examined the effect of stress on HRQOL (Gupchup *et al.*, 2004; Marshall *et al.*, 2008). This negative correlation between perceived stress and physical health among MPharm students is probably due to the increased age of MPharm students. About half of the students were more than 30 years old, while the mean age of the majority of the students used in previous studies was less than 30 years old. The lack of correlation between perceived stress and the physical component of HRQOL among non-pharmacy master's students is probably due to age. The majority of non-pharmacy master's students were less than 30 years old.

Furthermore, smoking cigarettes was the only independent variable for which the difference in the PSS scores was significant for both MPharm and non-pharmacy master's students. These results are consistent with those of other studies (Liu *et al.*, 2007; Naquin & Gilbert, 1996). Naquin *et al.* showed that students who smoked experienced higher stress levels than students who did not smoke (Naquin & Gilbert, 1996). Another study conducted by Liu *et al.* showed significant differences between the perceived stress scores of local college students with diverse smoking levels in seven cities in China (Liu *et al.*, 2007). In this study, there were insignificant differences in the PSS scores of the MPharm students based on subset analyses according to sex, age, marital status, nationality, alcohol use, exercise habits and average daily commute from residence to school.

Two studies on stress conducted with pharmacy students showed that female students exhibited higher stress levels than males (Gupchup *et al.*, 2004; Marshall *et al.*, 2008). The data analysis in this study did not reveal any differences in stress levels based on sex or marital status. This finding is consistent with that of other studies conducted by Dutta *et al.* and Frick *et al.* In these studies, there were no significant differences in stress levels based on sex or marital status among students in four schools of pharmacy (Dutta, Pyles & Miederhoff, 2006; Frick *et al.*, 2011).

In this study, the three most common stress triggers reported by MPharm students were linked to the study program (Table IV). Examinations, case presentations and clerkship reports are stressful events, according to MPharm students, which are inevitable in an MPharm program. Certain strategies should be adopted by the school or university in order to help students to learn how to actively manage their stress in order to reduce any negative effects that stress may have on their lifestyle choices and mental and physical health. These skills would also be useful for students when they begin their professional practice. A career as a pharmacist or in other

healthcare professions can be stressful, and controlling that stress effectively makes pharmacists more productive practitioners (Barnett & Hopkins, 1986; Lapane & Hughes, 2006; Wolfgang *et al.*, 1988). The most common self-reported suggestion made by MPharm students in this study to their alleviate stress was to extend the period of study program.

The limitations of this study should be taken into account before generalizing the results. First of all, this study is cross-sectional in nature and therefore varying stress and HRQOL scores throughout the academic year could not be captured. Longitudinal studies are needed in order to address this issue. As this study was performed at one school of pharmacy at a public university and the number of MPharm students was less than thirty students, the results should be generalized to other colleges of pharmacy with caution. A national study including all schools of pharmacy would provide more generalisable results. Other contributing factors that affect stress and HRQOL in addition to those highlighted in this study need to be identified. Moreover, the actual effectiveness of the strategies that are employed by MPharm students in order to cope with stress in order to improve their stress levels and quality of life warrants further investigation in a longitudinal study. It is important to take into consideration the implications of this study. Although it is not clear whether or not the relationship between perceived stress and the mental and physical components of HRQOL affected the academic performance of the MPharm students in this study, there is evidence of an inverse relationship between stress and academic performance among students (De Meuse, 1985; Linn & Zeppa, 1984; Sanders & Lushington, 2002; Stewart, Lam, Betson, Wong & Wong, 1999).

Conclusion

MPharm students reported relatively lower levels of perceived stress than non-pharmacy students; however, MPharm students reported relatively lower mental HRQOL than non-pharmacy students. In addition, higher levels of perceived stress were negatively correlated with mental and physical HRQOL. The most common stress triggers reported by MPharm students were related to the curriculum (examinations, case presentations and clerkship reports). Most students employed positive lifestyle strategies in order to alleviate stress. Strategies should be developed in order to alleviate perceived stress and to promote the mental and physical HRQOL of these students.

Further studies using a larger sample of students from more schools of pharmacy throughout country are required in order to assess the impact of the relationship between perceived stress and mental and physical HRQOL on academic performance among MPharm students. Further studies will identify other contributing factors to the high perceived stress levels and poor mental and physical HRQOL of MPharm students and will investigate the actual effectiveness of strategies designed to improve stress levels and the mental and physical health of students as they progress through the MPharm program.

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