

ORIGINAL ARTICLE

EFFECTS OF A BRIEF STRESS REDUCTION INTERVENTION ON MEDICAL STUDENTS' DEPRESSION, ANXIETY AND STRESS LEVEL DURING STRESSFUL PERIOD.

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Abstract

Objective: The objective of this study was to evaluate whether students exposed to a brief stress reduction intervention would have lesser stress, anxiety and depression levels compared to their non-exposed classmates during stressful events. **Methods:** The Ex Post Facto design was applied in this study. Students who were exposed and not exposed to a brief stress reduction intervention were surveyed during a continuous examination and during the final examination. The Depression Anxiety Stress Scales (DASS) was used to examine effects on anxiety, stress, and depression levels. **Results:** The exposed students statistically had lower anxiety and depression scores than the non-exposed students during the stressful period. Reduction of stress, anxiety and depression scores was sustained during the stressful period. **Conclusion:** The significant reduction of anxiety and depression scores suggested that brief intervention was effective in the enhancement of the psychological wellbeing of exposed medical students during stressful period. *ASEAN Journal of Psychiatry, Vol.12(1): Jan – June 2011: XX XX.*

Keyword: Medical Student, Brief Stress Management, Anxiety, Stress, Depression.

Introduction

In 2003, the World Health Organization (WHO) reported that mental health is the fourth leading contributor to the global burden of diseases; about 450 million people suffer from a mental or behavioral disorder and nearly 1 million people commit suicide in a year [1, 2]. WHO projected that in 2020 mental health will be the second leading contributor to the global burden of diseases behind the cardiovascular related diseases [2]. These facts suggest a substantial growth of pressure in individuals' daily lives.

Medical students and professionals are not immune from this. In fact, studies have found that the prevalence of mental disorder among them are higher compared to the normal population [3-7]. Studying in Medicine is often considered difficult and highly competitive. That is the reason why medical training is regarded as a highly stressful period by most medical students. Studies have revealed a high prevalence of psychological distress among medical students, ranging from 30% to 50%, particularly in first-year medical students as they are facing a period of adjustment to the

new environment of medical training [5]. The psychological distress among medical students is associated with anxiety and depression [8, 9], interpersonal conflict [10], sleeping problems [11], and lower academic and clinical performance [12]. It was also found to decrease attention, reduce concentration, impinge on decision making, and reduce students' abilities to establish good relationships with patients resulting in a feeling of inadequacy and dissatisfaction with clinical practice in the future [10]. It was highlighted that the depression among medical students was twice as prevalent between the beginning and end of the first year [13, 14]. On top of that, it was linked to suicide [15], immune system alterations [16], drug abuse [17, 18] and abuse of alcohol [19]. Numerous studies have emphasized that these psychological morbidities occur in medical students at various stages of their training [14, 20-22]. The literature consistently reports that markers of medical student wellbeing deteriorate with time with the lowest point being found in the pre-exam periods [23]. It is worth noting that, these unwanted consequences were related to some aspects of medical training and it might hinder the noble ambitions and values of medical education which is to produce healthy and competent doctors to serve society [24].

Several medical education constituencies have emphasized the importance of teaching stress management and self-care skills to medical students [25, 26]. This emphasis is reflected in accreditation standards for medical education which requires medical schools to have programs promoting the well-being of students and facilitating their adjustment to the emotional, spiritual, mental and physical demands of medical school [27]. Realising that, many medical schools have developed a variety of programmes to tone down stress such as

mindfulness-based stress reduction course [28, 29], wellness electives [23, 30], mind-body medicine course [31], and stress reduction workshops [32, 33]. A recent literature review discovered that, although more than 600 articles addressed the importance of stress management programs in medical curricula, only 24 reported intervention programs with accompanying data [28]. This means that although there is literature on stress management in general, their specific and scientific application to medical education has been largely unexplored [28]. It is worth mentioning that teaching future physicians a set of skills to cope with the stress of their profession will likely aid both their future career success and personal well-being [34]. It is commonly believed that the decline in wellbeing of medical students is avoidable [23].

At the School of Medical Sciences, Universiti Sains Malaysia, a short-duration stress management intervention called the Medical Student Wellbeing Workshop was conducted in response to this realisation. This workshop was reported as a well-accepted and promising stress reduction intervention for medical students [32, 35, 36]. From that notion, the primary objective of this study was to evaluate whether the students who were exposed to the intervention would have lesser stress, anxiety and depression levels compared to their classmates who were not exposed to it during stressful events particularly during examinations. If the objective was met, then a secondary objective was to determine whether any noted improvement would be sustainable. It is hoped that the results obtained will provide better evidence on the potential benefits of the intervention.

Methods

The School of Medical Sciences (SMS), Universiti Sains Malaysia (USM) practices an integrated, problem-based and community-oriented medical curriculum. This five year programme is divided into three phases. Phase I (year 1) is the fundamental year focusing on organ-based systems. Phase II (year 2 and 3) continues the system-based approach and introduces the basics of clinical clerkship. Phase III (year 4 and 5) is the clinical phase whereby the students are rotated through all the clinical disciplines.

The year 1 medical students have to go through three continuous examinations and one final examination before they can progress to the second year of study. The final examination contributes 70% to the total marks and the other 30% are contributed by the three continuous examinations, each contributing 10%. The students must obtain a total examination mark of more than 50% for them to progress to the second year. Otherwise, they have to repeat the phase. The author believes that the final examination is a more stressful period for the students compared to the continuous examination.

There were 19 students who were exposed to the intervention and about 177 students who were not exposed to it. All of them were the new first-year medical students of the 2009/2010 academic session. The total number of the new first year medical students registered in the 2009/2010 academic session was 196.

A causal-comparative study (Ex Post Facto) design was applied in this study. In this type of study, subjects in the intervention group were selected from the students who were exposed to the intervention. While, the subject in the control group were selected from the students who were not exposed to

the intervention. The list of the students was obtained from the organizer. The outcomes that were measured were stress, anxiety and depression scores. Sample size was determined based on the data obtained from a previous study [32]. Population standard deviation was 2.79 and the expected difference mean was 2.38. The sample size calculated by the SPSS software [44] based on power of study at 0.8 and significant level at 0.05 was 23 subjects per group (intervention group and control group). Since the total number of students who were eligible for intervention group was 19, therefore, sample size for control group was recalculated to maintain the power of study. Recalculation indicated that the minimum acceptable sample size for control group was 29 students to maintain the power of study. The adjusted sample sizes for intervention and control groups were 19 and 29 students respectively. All of the 19 students who were exposed to the intervention were selected as subjects for intervention group. Simple random sampling was applied to select subjects for the control group from the list of the students that were not exposed to the intervention. All of the student names were given a number from 1 to 177. Random numbers were generated by the SPSS software [44].

Demographic data such as gender, race, entry qualification, age, and matrix number were obtained from the study subjects. The DASS was administered to measure depression, anxiety and stress level [45, 46] of the students during the third continuous examination (time 1) and the final examination (time 2) which were held approximately three and six months respectively after the workshop ended. Face-to-face sessions were held with the students in an examination hall just after the examinations ended. Data was collected by guided self-administration. The time taken

by the students to fill in the inventory was around 10 minutes and it was returned on the same day.

The DASS was developed by Lovibond in 1993 for people aged 17 and older however it may be suitable for people of younger age [45]. It is used to assess the severity of core symptoms of depression, anxiety and tension (or stress) over the previous week; in general it provides a broad spectrum measure of psychological distress, indicating the severity and frequency of symptoms (46). It is a self-reporting instrument and available in two versions; 42 items (DASS-42) and 21 items (DASS-21). The DASS-42 and DASS-21 has three main scales which are depression (DASS-D), anxiety (DASS-A) and stress (DASS-S); each scale has 14 items and 7 items respectively. Each item uses four-point response scale and separate depression, anxiety and stress scores are calculated by summing item scores. This instrument is suitable for tracking change in severity over time, e.g. before and after intervention (45). Based on the DASS manual, for student samples the scale scores are classified into normal (0 to 77), mild disorder (78 to 86), moderate disorder (87 to 94), severe disorder (95 to 97) and extremely severe disorder (98 to 100) [46]. The scale scores of DASS-21 must be multiplied by two to simulate the full-scale version. The reliability coefficient of depression, anxiety and stress range from 0.81 to 0.97, and the three subscales showed discriminative ability to differentiate between psychiatric patient and non-psychiatric patients [45]. The DASS-21 was used in this study because it requires less time to administer; furthermore, studies showed that it is superior and more consistent compared to the full-scale version [46].

The investigator had obtained permission from the School of Medical Sciences and the Student Affairs and Development Department, Universiti Sains Malaysia prior to the study start. Each participant was given an identity code.

Data were analysed using Statistical Package for Social Sciences (SPSS) version 18. Significant level (α) was at 0.05 and confidence interval was 95%. Descriptive statistics were applied for analysis of the demographic data. Independent-t test was used to compare the mean depression, anxiety and stress scores between the two groups of students. The repeated measure ANOVA (group x time) test was used to determine sustainability of noted effects of the intervention on the depression, anxiety and stress scores of the two groups. The mean change of score was obtained by subtracting score at time 2 with the score at the time 1.

Overview of the intervention

Students had participated in the medical student wellbeing workshop as the brief stress reduction intervention voluntarily. The intervention was offered as a one-off session lasting for a duration of three to four hours in a weekend by the Student Affairs and Development Department, Universiti Sains Malaysia.

In the first 75 minutes, participants were given three mini lectures, 25 minutes each, related to stress concepts, stressors related to medical training, and coping strategies. In the second session, participants were given 25 minutes to fill in three inventories which were the 12-item General Health Questionnaire (GHQ-12), the Medical Student Stressor Questionnaire (MSSQ) and the Brief Coping Orientation of Problem Experienced (COPE) to help them identify their individual stress level, stressors and

coping strategies respectively. Then 60 minutes were allocated to them for discussion on the findings of the inventories with the facilitator. During the third session participants were given a 30-minutes mini lecture related to ways of handling stress and followed by 30 minutes of discussion and sharing of experience between peers and the facilitator. The last 20-minutes was allocated for the conclusion and feedback session to consolidate what they have learnt and gained as a result of attending this workshop.

The intervention objectives were to enable students to measure their stress level by the GHQ-12 (37-41), to recognize main stressors they are facing by the MSSQ (42) and to be aware of their main coping strategies by the Brief COPE (43). At the end of the intervention, it was hoped that participants would be able to:

- increase self-awareness concerning their stress, stressors and coping strategies.
- promote self-development of positive coping abilities toward stressors.
- develop self-improvement strategies to improve their stress management skills.

Results

A total of 48 year 1 medical students responded to the both surveys. The Chi-square and Independent-t tests showed that both groups were roughly homogenous in terms of gender, race, qualification and age distributions (Table 1).

Table 1: Demographic profile of participants

Variable	Intervention (N=19)	Comparison (N=29)	X ² -statistics ^a	t-statistics ^b	p-value
Gender, n (%)					
Male	5 (26.3)	14 (48.3)	2.315		0.128
Female	14 (73.7)	15 (51.7)			
Race, n (%)					
Malay	11 (57.9)	11 (37.9)	1.843		0.175
Non-Malay	8 (42.1)	18 (62.1)			
Qualification, n (%)					
Matriculation	16 (84.2)	26 (89.7)	1.008		0.604
HSC	2 (10.5)	1 (3.4)			
A-level	1 (5.3)	2 (6.9)			
Age, mean (SD)	19.00 (0.58)	18.93 (0.37)		0.505	0.616

^a Chi-square test, p-value < 0.05 considered as significant different.

^b Independent-t test, p-value < 0.05 considered as significant different

Table 2: Independent-t test results for the stress, anxiety and depression scores between groups at the time 1 and time 2.

Time	Variable ^{c, d}	Intervention (N=19)	Control (N=29)	t-statistics	p-value**
1	Stress score, mean (SD)	8.84 (7.25)	12.41 (9.79)	-1.362	0.180

Time 2 ^b	Anxiety score, mean (SD)	10.11 (8.10)	11.72 (10.61)	-0.565	0.575
	Depression score, mean (SD)	6.42 (8.10)	9.31 (9.56)	-1.085	0.283
	Stress score, mean (SD)	8.84 (7.16)	14.14 (10.81)	-2.879	0.067
	Anxiety score, mean (SD)	8.32 (7.92)	15.38 (11.47)	-2.338	0.024
	Depression score, mean (SD)	3.79 (5.92)	11.45 (11.72)	-2.630	0.012

** Independent-t test, p-value < 0.05 was considered as significant different

^a Data was collected during the third continuous examination of the year 1

^b Data was collected during the final examination of the year 1

^c Kolmogorov-Smirnov normality test was applied to test the normal distribution of each outcome. The normality test showed the p values were more than 0.05 indicating normal distribution.

^d Levene's test for equality of variances also showed the p values were more than 0.05 which indicated the variances were equal.

The independent-t test showed that the intervention group had significantly lower mean anxiety and depression scores compared to the control group (Table 2) during the final examination (time 2). The intervention and control groups had approximately equal mean stress, anxiety

and depression scores (Table 2) during the third continuous examination (time 1). These findings suggested that students who were exposed to the intervention significantly had lower anxiety and depression levels during the final examination.

Table 3: Paired-t tests results for stress, anxiety and depression scores.

Group	Pair	Variable ^c	Time 1 ^a	Time 2 ^b	t-statistics	p-value**
Intervention (N=1)	1	Stress score, mean (SD)	8.84 (7.25)	8.84 (7.25)	0.000	1.000
	2	Anxiety score, mean (SD)	10.11 (8.10)	8.32 (7.92)	0.794	0.437
	3	Depression score, mean (SD)	6.42 (8.10)	3.79 (5.92)	1.386	0.183
Control (N=29)	4	Stress score, mean (SD)	12.41 (9.78)	14.14 (10.81)	-1.345	0.189
	5	Anxiety score, mean (SD)	11.72 (10.61)	15.38 (11.47)	-2.412	0.023
	6	Depression score, mean (SD)	9.31 (9.56)	11.45 (11.72)	-1.360	0.185

** Paired-t test, p-value < 0.05 was considered as significant different

^a Data was collected during the third continuous examination of the year 1

^b Data was collected during the final examination of the year 1

^c Kolmogorov-Smirnov normality test was applied to test the normal distribution of mean different (Time 2 – Time 1) for each outcome. The normality test showed the p values were more than 0.05 indicating normal distribution.

The paired-sample t test showed that anxiety score of the control were significantly increased during the final examination

(Table 3). Other scores were not significantly increased during the final examination.

Table 4: Repeated Measure ANOVA results for stress, anxiety and depression scores.

	<u>Stress</u>			<u>Anxiety</u>			<u>Depression</u>		
Source	df	MS	F	df	MS	F	df	MS	F
Between subject									
Group	1	451.32	3.102	1	432.67	2.71	1	638.60	4.45*
Subject/group	46	145.49		46	159.75		46	143.51	
Within subject									
Time	1	17.06	0.69	1	19.98	0.51	1	1.40	0.04
Time*Group	1	17.06	0.69	1	170.15	4.35*	1	130.57	3.71
Time*subject/group	46	24.59		46	39.13		46	35.22	

MS = mean square, df = degree of freedom, F = F-statistics * p < 0.05

Mauchly's test of sphericity was applied to determine the equality of variances of stress, anxiety and depression scores. The test showed the p values were more than 0.05 indicating variances were equal.

The results of a 2 x 2(time x group) repeated measure ANOVA, conducted to examine group-time interaction effects as well as group and time effects, are displayed in the table 3. When taking both group and time effects and their interaction effect into consideration, observed differences in depression scores (p = 0.040) were statistically significant, however stress (p = 0.085) and anxiety (p = 0.107) scores failed to reach significance. This finding indicated

that depression scores between intervention and control group were significantly different, while the stress and anxiety scores between the groups were approximately equal.

Figure 1 shows the magnitude of the intervention group's mean depression scores at times 1 and time 2 by contrast with those of the control group. The intervention and control groups, which were not differed significantly at the time 1, were distinguishable significantly from each other at the time 2 (table 2 and table 4). However, changes of depression scores over time for both groups were not significant (Table 3 and Table 4).

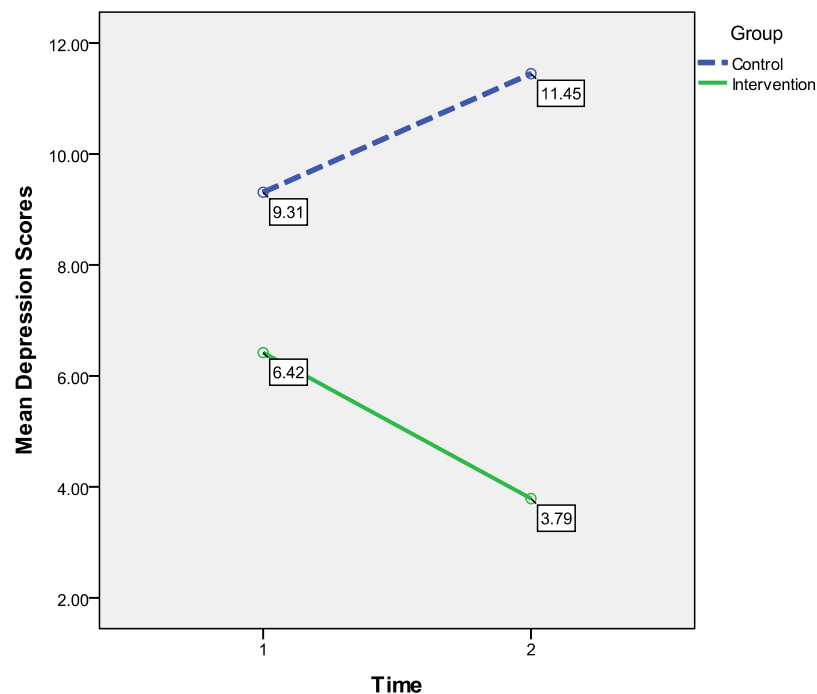


Figure 1: The comparison of mean depression scores between intervention and control group at the time 1 and time 2.

The results shows that there were significant interaction effect ($p = 0.043$) for anxiety scores, however its time effect ($p = 0.478$) failed to reach significance. It was also found that there were no significant time or interaction effects for stress and depression scores. This finding indicated that the changes of anxiety scores between time 1 and time 2 were significantly different, but the observed means between the groups were approximately equal. The stress and depression scores between the groups and over the times were roughly equal (Table 4).

Figure 2 shows the changes magnitude (score at times 2 – score at time 1) of the intervention group's mean anxiety scores by contrast with those of the control group. The result clearly shows that there was a reduction of anxiety scores in the intervention and an increased of anxiety scores in the control group (Table 4).

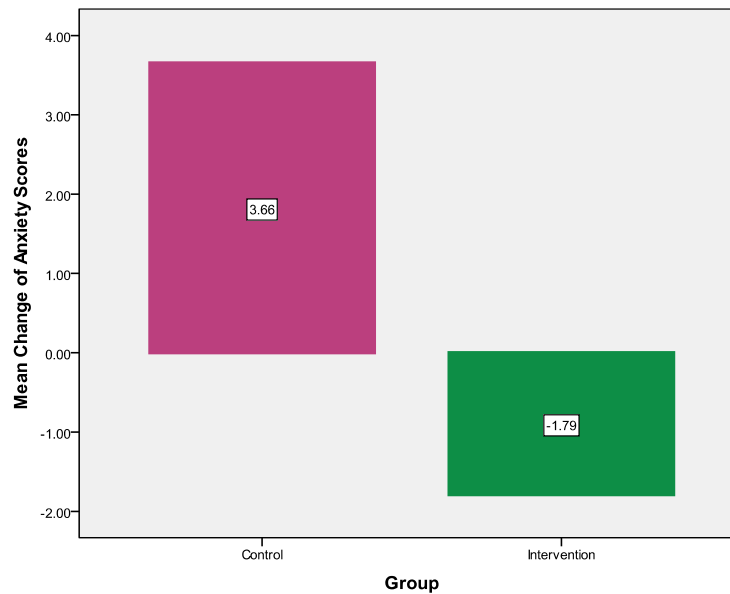


Figure 2: The mean change (time 2 – time 1) of anxiety scores between intervention and control groups.

Discussion

The brief stress reduction intervention was offered as part of the student development activities run by the Student Affairs and Development Department, Universiti Sains Malaysia for the new first year medical students. Merit points which would grant them privilege to get accommodation in the campus were given to students who voluntarily participated in the intervention. It was done as an effort by the university to address issues related to medical students stress, anxiety and depression during medical training as it was prevalent among them [3-6, 8-14].

It is clear that medical school training may affect medical student's health, in fact, it may be a health hazard to them [47]. This is the reason why many medical schools internationally, particularly in US, are attempting to change curricula to address those issues [8, 31]. To date numerous interventions were done to tone down the widely known stresses of medical training

[8]. These interventions varied from short duration interventions such as the stress management workshop [33] to long duration courses such as mindfulness-based stress reduction courses [28, 29], wellness electives [23, 30] and the mind-body medicine course [31]. The outcomes of these interventions were varied [8].

The current study results suggested that students who were exposed to the brief stress reduction workshop developed skills that enabled them to cope more effectively with the stresses of medical training. These can be seen clearly during the final examination (time 2) where they had significantly reduction of anxiety level and lower depression level compared to their non-exposed classmates. Even more remarkable, the decreases of stress, anxiety and depression levels were decreased or sustained for duration of three months following the time 1. These findings suggest that the effects of the workshop may be sustainable. Therefore, a longer duration of follow up of this cohort is vital to confirm the sustainability of the effects. The author

postulates that the significant reduction of the intervention group's anxiety levels compared to the comparison group over time may be due to the students having intrinsically developed positive coping skills and improved stress management skills that allowed them to cope with stressful events much more effectively [48]. Even though this was not directly studied here, clearly it is an area of interest for further study.

It is worth noting that the literature consistently reported that medical students' psychological wellbeing deteriorates throughout the medical school training with the lowest point being found within examination periods [16, 23, 47]. For that reason data in this study demonstrates enhancement of medical student psychological wellbeing at a time when it would be expected to be at its lowest [16, 23]. These findings suggested that the brief stress reduction intervention has beneficial effects in toning down medical students' stress, anxiety and depression levels. The encouraging effects of the brief intervention found in this study are comparable with the effects found in the longer duration interventions such as mind-body medicine course and mindfulness-based stress reduction program [8, 28, 29, 31]. Although this was not the study objective, obviously it is an area of interest for further study. It is noteworthy that this study finding conforms to the previous findings of a previous study done by the author where the intervention was found to be an effective way in reduction of stress level and enhancement of psychological wellbeing among medical students [32]. In the light of this, it is worth noting that teaching future doctors on how to cope effectively with the stress of their profession will likely help both their future career success and development of positive personal qualities and well-being [34].

Clearly, the current study had several limitations. The first limitation is that both groups were not randomised. It can be said that the voluntary nature of the intervention was more likely to attract students who were highly motivated to change and thus more sensitive to any intervention process done. However, having students voluntarily participating in the intervention and comparing them to their classmates was found to be more practical and feasible [31]. The second limitation is that the stress, anxiety and depression level before the intervention was not measured due to the major limitation of the Ex Post Facto study design because of the fixed independent variables. Thus, post improvement as a result of the intervention cannot be concluded. Finally, the unequal sample size between the intervention and comparison groups may compromise generalisability of the results to the medical student population. Considering all these limitations, better study design such as a randomised control trial with a better student representation from pre-clinical and clinical years should be conducted in the future to confirm the findings of this study.

Even though the sample size for the intervention group in this study was small, this study used a validated instrument to measure the intended outcomes and had a control group to compare with. Nevertheless, this study has provided encouraging information on the potential benefits of the one-off brief stress reduction intervention. Furthermore, this brief stress reduction intervention can be easily replicated, adopted and implemented in any medical school due to the minimal time required and utilisation of non-specialist facilitators.

Conclusion

The current study findings consistently showed that student who were exposed to the stress reduction intervention had lower anxiety and depression levels compared to the non-exposed students during the stressful period of examinations. The decreases of the stress, anxiety and depression scores were sustained for three months after the continuous examination, suggesting that benefits of the brief intervention may be sustainable. Perhaps, the brief stress reduction intervention could be adopted by medical schools for their students since it can be easily replicated, adopted and implemented with a minimum duration of time as well as utilisation of non-specialist facilitators.

Acknowledgment

Our special thanks to the School of Medical Sciences and the Student Affairs and Development Department, Universiti Sains Malaysia for supporting and allowing us to involve their first year medical students in this study. Our special thanks to Dr Ahmad Fuad Abdul Rahim for his kind advices in writing this article and the academic staff for their help. Last but not least, my deepest appreciation to the first year medical students of the 2009/2010 academic session for participating in this study.

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Received: 10 February 2011

Accepted: 12 April 2011