

Original Research



Evaluation of an intervention package to reduce occupational stress among secondary school teachers: a cluster randomized study

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Abstract

Introduction: Prevalence of occupational stress (OS) among secondary teachers in the district of Colombo, Sri Lanka was found to be 83.4% in 2017, indicating the need for an intervention to prevent its effects.

Objectives: To evaluate the effectiveness of an intervention to reduce OS among secondary teachers in Sinhala medium government schools in the district of Colombo

Methods: A cluster randomized trial (SLCTR/2019/017) used clusters of 10 secondary schools in Colombo District, which were assigned randomly to intervention and control arms; each arm had 300 teachers. A package of nine-sessions of cognitive behavioural (CB) and relaxation technique-based activities designed through evidence generated in a systematic review was delivered as interactive group sessions over a period of six months. Effectiveness of the intervention in reducing OS was assessed after four weeks using multivariate Generalized Estimating Equation analysis. Reducing psychological distress and adopting healthy lifestyles were assessed as secondary outcomes of the intervention.

Results: Intervention was significantly effective in reducing OS (OR=0.3; 95% CI=0.2, 0.5), psychological distress (OR=0.03; 95% CI=0.01, 0.07) and smoking (OR=0.09; 95% CI=0.01, 0.7) among the teachers. It also significantly increased the knowledge about OS (OR=0.6; 95% CI=0.5, 0.7), healthiness of diet (OR=0.3; 95% CI=0.2, 0.4), level of adequate physical activity (OR=3.2; 95% CI=2.1, 4.9) and effective coping of OS (OR=0.2; 95% CI=0.17, 0.3). The relative risk reduction (RRR) of OS with the intervention remained at 22.6%, the absolute risk reduction (ARR) was 19.4% and the number needed to treat (NNT) was five.

Conclusions & Recommendations: The intervention package was highly effective to reduce OS among secondary teachers and is recommended to be incorporated to the basic training of teachers or implemented through the school health programme.

Keywords: occupational stress, intervention package, teachers, cluster randomized trial

Introduction

Occupational stress (OS) is defined as ‘the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources or needs of the worker’ (1). Occupations in the areas of human services such as education, health and law enforcement are considered as at risk of high OS (2). The prevalence of OS differs across countries and the occupational groups (3). In 2017, the prevalence of OS among secondary school teachers in Colombo District of Sri Lanka was found to be as high as 83.4% (4). Authors conducted a systematic review and meta-analysis and designed a locally relevant intervention to address OS among secondary school teachers (5). The intervention was packaged as nine sessions of cognitive behavioural (CB) and relaxation technique-based interventions organized into nine topics of adopting healthy lifestyles, relaxation techniques, problem solving, communication, coping and anger management and motivation. This paper describes the cluster randomized trial which evaluated this intervention to reduce OS among secondary teachers in Colombo, Sri Lanka.

Methods

A cluster randomized controlled trial was registered in the Sri Lanka Clinical Trials Registry (SLCTR/2019/017). A schematic presentation of the design is shown in Figure 1. Types 1AB or 1C government schools (with grades 1-13) of Sinhala medium in Colombo District, with a total of at least 40 secondary teachers (grades 6-13) per school were eligible to be included in the trial.

In the trial, a cluster was defined as 30 secondary teachers selected from a single school. The number of clusters required to detect an estimated difference of 20% in the OS outcomes between the intervention (IA) and control (CA) arms was based on the baseline prevalence of OS among teachers estimated as 83% (4); cluster size of 30; intraclass correlation

coefficient (ICC) of 0.1 (6-7); alpha error of 5%; and beta error of 20%. Accordingly, the required number of teachers per group was 300 with allowances for 10% non-response and loss to follow-up (8). It indicated 10 clusters per group along with 300 schoolteachers.

Allocation concealment was based on clusters selected using a two-stage stratified random sampling. In the first stage, two out of the four educational zones in the district of Colombo were selected. The selection of schools and allocating them to Type 1AB and Type 1CA schools followed stratified randomization based on the school type and zone. Accordingly, 14 Type 1AB schools and 6 Type 1C schools were randomized to IA and CA. Within each selected school, 30 teachers were selected randomly from a list of secondary teachers at the school. Those who were unable to read or write in Sinhala, diagnosed as having psychiatric disorders, having stress associated psychiatric disorders and pregnant were excluded. Teachers with psychiatric disorders were excluded by self-report or going through their medical diagnosis records. Also, teachers who scored high OS level were subjected to a clinical interview by the trained researcher and if identified to be having any stress related psychiatric condition, were excluded.

The intervention was packaged as CB and relaxation technique-based interventions to be delivered as nine interactive group sessions, as given below;

The principal investigator (BD) and a research assistant with a degree in Psychology were trained by a consultant psychiatrist. Each session lasted approximately 40 minutes; and was conducted at two-week intervals. Participants were informed and reminded of the sessions regularly. Control group did not receive any interventional activity.

Primary outcomes of the intervention were the proportions of teachers with OS and psychological distress, while the secondary outcomes were the

median scores obtained in the assessments of knowledge on OS and healthiness of diet, the proportion of teachers with adequate levels of physical activity, current smokers and current drinkers among teachers, and the median score obtained by teachers in the assessment of effective coping of OS. The validated self-administered version of TSI (Teacher Stress Inventory) (4) was used to measure OS. Distress was measured using General Health Questionnaire (GHQ) 12 validated to

Sri Lanka (10). Tools to assess knowledge on OS and diet were developed with consensual validity. IPAQ tool validated to Sri Lanka was used to measure physical activity (11), smoking and alcohol consumption by a tool developed by Gamage (2014) (12). Effective coping of OS was assessed using Brief COPE (13). All were self-administered tools in Sinhala medium administered prior to the intervention and four weeks after its completion.

Session	Aims
1. Introduction	Enabling the participants to appreciate what OS is and to identify how stress affects their body and mind and to identify the consequences of OS in schools including poor teaching performance.
2. Introduction	
3. Progressive muscle relaxation (PMR) and relaxation	A practical session on progressive muscle relaxation and CB intervention to examine their own thoughts and emotions, recognize when negative thoughts and emotions are escalating in intensity when in stress and to use strategies to overcome stress.
4. Healthy lifestyles	Aimed motivating the teachers to adopt healthy lifestyles that helps them to overcome OS.
5. Healthy lifestyles	
6. Effective problem solving	Aimed at enabling teachers to effectively solve problems related to OS. CB theory-based exercises on effective problem solving was taught in role play scenarios of real-life situations.
7. Communication skills, conflict resolution, negotiation and assertiveness	Aimed to enable the teachers to communicate effectively to solve OS related problems. Role plays of real-life scenarios were the interventional activities.
8. Effective coping of OS and anger management	Aimed to enable teachers to use techniques to cope up with OS and manage anger effectively. CB theory-based exercises on how to manage occupational stress related problems using emotion and problem focused coping was the basis.
9. Positive thinking and motivation	Designed to motivate the teachers to perform teaching activities better and teach skills on positive thinking, identifying, and correcting cognitive errors.

Data analysis

Data entry and analysis was done using the Statistical Package for the Social Sciences (SPSS) version 20. A multivariable Generalized Estimating Equation (GEE) analysis was conducted to assess the effectiveness of intervention while adjusting for the effect of clustering and other independent variables (14-16). The analysis was performed selecting the cluster (school) as the unit of analysis. Primary and

secondary outcome variables were used as dependent variables in separate GEE models. Group (IA or CA) was the main independent variable, while sex, teaching in Grade 6-9, age, number of periods worked per week and the baseline value of the dependent variable were used as independent variables. A p-value <0.05 was considered to indicate statistical significance.

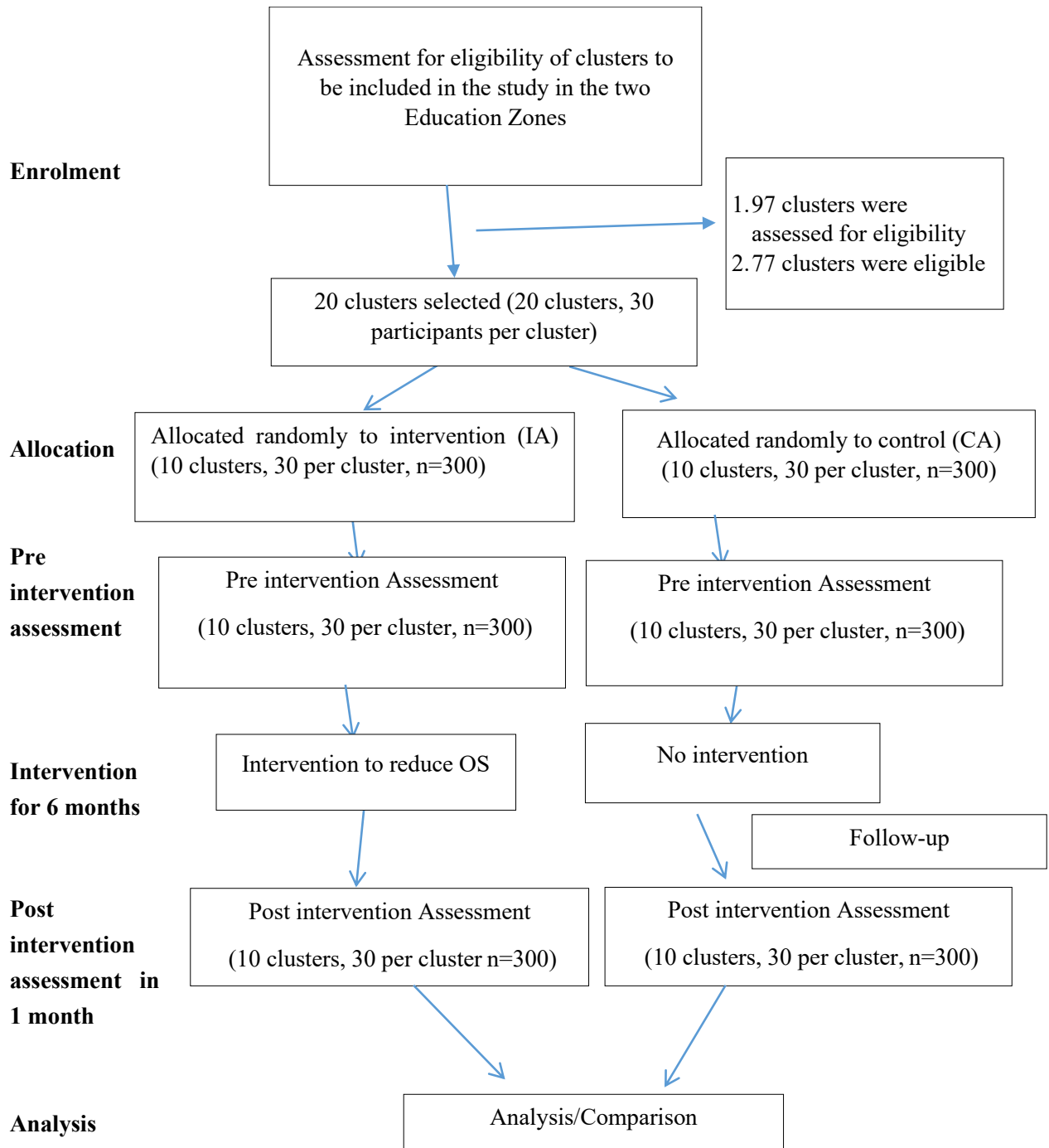


Figure 1: Schematic presentation of the study design

Results

Response rate was 100%. The schematic presentation showing the number of study units participated in the intervention study is shown in Figure 1. A significant difference was noted between IA and CA in relation to the sex distribution (p=0.02)

and teaching in Grade 6-9 classes (p=0.01) (Table 1). Further, in the pre-interventional assessment, 10.0% of the teachers in IA were current drinkers compared to 17.3% in the CA (p=0.009) (Table 2).

Outcomes of the intervention

As given in Table 3, the intervention had a significant

protective effect on OS as well as on psychological distress after controlling for clustering and confounding factors. Also, IA teachers showed a significantly higher knowledge score on OS,

healthiness of diet and for being adequately physically active, while for being a current smoker and for effective coping of OS. The IA did not show any significant effect on current drinking.

Table 1: Comparison of the characteristics of teachers in the intervention and control arms

Characteristics	Intervention arm N=300		Control arm N=300		Significance
	No.	%	No.	%	
Age (completed years)					
20 - 30	35	11.6	25	8.4	$\chi^2=2.6$; df=3 p=0.5
31 - 40	98	32.7	111	37.0	
41 - 50	96	32.0	97	32.3	
51 - 60	71	23.7	67	22.3	
Sex					
Male	49	16.3	73	24.3	$\chi^2= 5.9$; df=1 p=0.02
Female	251	83.7	227	75.7	
Ethnicity					
Sinhala	294	98.0	294	98.1	$\chi^2=0.5^*$; df=1 p=0.5
Tamil	3	1.1	4	1.3	
Muslim/Moor	2	0.6	2	0.6	
Burgher	1	0.3	0	0.0	
Religion					
Buddhist	282	94.0	276	92.0	$\chi^2=0.9^*$; df=1 p=0.3
Hindu	2	0.7	4	1.3	
Catholic/Christian	12	4.0	18	6.0	
Islam	3	1.0	2	0.7	
No response	1	0.3	0	0.0	
Current marital status					
Married	253	84.3	255	85.0	$\chi^2=0.1^*$; df=1 p=0.8
Single	44	14.7	38	12.7	
Widowed/divorced	3	1.0	7	2.3	
Having children					
Yes	234	78.0	231	77.0	$\chi^2=2.0$; df=2 p=0.4
No	22	7.3	31	10.3	
Not Relevant	44	14.7	38	12.7	
Monthly average household income (LKR)					
≥ 50 000	93	31.0	100	33.4	$\chi^2=1.9$; df=3 p=0.6
50 001 - 75 000	83	27.7	91	30.3	
75 001 - 100 000	60	20.0	57	19.0	
> 100 000	64	21.3	52	17.3	
Teaching in grades 6-9					
Yes	176	58.7	205	68.3	$\chi^2=6.0$; df=1 p=0.01
No	124	41.3	95	31.7	

*Chi-squared test was considered with rows amalgamated as Sinhala and non-Sinhala categories; Buddhist and non-Buddhist categories; and married and other categories

The RRR of OS with the intervention remained at 22.6%, and the ARR was 19.4% (Table 4), indicating that, out of 100 teachers receiving the intervention, 19 would be prevented from developing OS. RRR was 20%, indicating that the intervention reduced the risk of OS by 20% relative to the control. The NNT

of OS was five, indicating that this intervention must be administered to five participants to prevent one person from having OS. The corresponding NNT of distress was three.

Table 2: Distribution of the outcomes of the intervention and control arms in the pre-intervention assessment

Outcomes	Intervention arm		Control arm		Significance
	No.	%	No.	%	
Primary outcomes					
Stressed	249	83.0	248	82.7	$\chi^2=0.01$; df=1; p=0.9
Distress	79	26.3	79	26.3	$\chi^2=0.0$; df=1; p=1.0
Secondary outcomes					
Knowledge on OS*	13	9-17	13	9-17	Z=-0.7; p=0.5
Healthiness of the diet*	5	4-5	4	3-5	Z=-1.1; p=0.3
Adequate physical activity	117	39.0	101	33.7	$\chi^2=1.8$; df=1; p= 0.2
Current smoker	2	0.7	10	3.3	$\chi^2=4.1$; df=1; p=0.04
Current drinker	30	10.0	52	17.3	$\chi^2=6.8$; df=1; p=0.009
Effective coping of OS*	68	59-76	68	58-76	Z=-0.4; p=0.7

*Median and IQR given for the continuous variables; OS=occupational stress

Table 3: Distribution of the outcomes in the intervention and control arms in the post-intervention assessment

Outcomes	Intervention arm	Control arm	Adjusted OR (95% CI)**	Significance
	No. (%)	No. (%)		
Primary outcomes				
Occupational stress	199 (66.3)	257 (85.7)	0.3 (0.2, 0.5)	<0.001
Psychological distress	4 (1.3)	100 (33.3)	0.03 (0.01, 0.07)	<0.001
Secondary outcomes				
Knowledge on OS*	21 (18-23)	10.5 (7-15)	0.6 (0.5, 0.7)	<0.001
Healthiness of diet*	6 (5-6)	4 (3-5)	0.3 (0.2, 0.4)	<0.001
Adequate physical activity	177 (59.0)	94 (31.3)	3.2 (2.1, 4.9)	<0.001
Current smoker	1 (0.3)	10 (3.3)	0.09 (0.01, 0.7)	0.02
Current drinker	28 (9.3)	54 (18.0)	0.5 (0.2, 1.0)	0.05
Effective coping of OS*	79 (71-87.8)	63.5 (55-71)	0.2 (0.17, 0.3)	<0.001

* β (95% CI) given for continuous variables

**GEE Analysis: Adjusted OR given after adjusting for clustering and pretest level of each outcome variable, sex, age, teaching in Grade 6-9 and periods worked per week

OS=occupational stress

Discussion

In 2017, the prevalence of OS among secondary teachers in public schools in the district of Colombo

was found to be as high as 83.4% (4), indicating the need for urgent intervention to prevent catastrophic, physical, psychological and economic burden to teachers themselves, families and society by large

(4). The aim of the current intervention targeting teachers was to enable the secondary school teachers to identify what makes them stressed, how it affects

their teaching performance and to empower them to overcome OS or to better cope with it.

Table 4: Benefit of the intervention to reduce OS among teachers

Outcome	Intervention arm (%)	Control arm (%)	ARR (C - I)	RRR (C - I)/C	NNT (100/ARR)
Occupational stress	66.3	85.7	19.4	22.6	5
Psychological distress	1.3	33.3	32.0	96.0	3

ARR=Absolute Risk Reduction; RRR=Relative Risk Reduction; NNT=Number Needed to Treat

The effectiveness of the intervention targeted at teachers was assessed using a series of primary and secondary outcome indicators, analysed using a multivariate GEE analysis which allowed adjustments for other independent variables and clustering effect. All GEE analyses confirmed that the intervention significantly reduced OS, psychological distress as well as smoking, while it significantly increased the knowledge about OS, healthiness of diet, level of adequate physical activity and effective coping of OS among the teachers. This can be taken as evidence on the effectiveness of planned intervention. Demonstrating a reduction in the proportion of teachers with OS was the most desired effect of the tested intervention. Of the 29 interventional studies included in a recent systematic review, 23 had used OS as an outcome indicator to evaluate its effectiveness (5). Further, 18 of these studies showed comparable results to the present study (17-34).

Reducing the proportion of teachers with psychological distress was also an outcome indicator, which proved that the present intervention was effective. This finding was similar to that reported in five of the 29 studies included in the same systematic review (5). Of them, all showed results similar to the present study (30, 32, 35). In the post-test, presence of a non-significant increase of OS in the CA at both the individual and cluster level analysis may be due to the effects of external general stressors that were experienced in the country. One specific stressful event was the Sri Lanka Easter bombings on 21 April

2019, which affected the security of schools. Correct knowledge is an essential element for a person to appreciate the need to change. Though important, none of the intervention studies included in the systematic review (5) had assessed knowledge on OS as an outcome measure, making this a unique feature of the present study.

Another unique feature of the present intervention was it being designed to be comprehensive to improve most aspects of OS, including the lifestyles related to diet, physical activity and smoking among teachers and all these lifestyle-related outcomes showed a significant improvement in the IA. Long term sustainability of these behaviour changes cannot be commented on, nevertheless, it is likely that 'refresher' programmes to reinforce the behaviours may be needed in the long run. In the face of a high burden of non-communicable disease (NCD) in the country, the intervention with the primary aim to reduce OS among schoolteachers being effective in improving three important lifestyles which are also major risk factors for NCDs, is indeed encouraging evidence. Effective coping of OS is an important outcome of an intervention to reduce OS among any occupational group. Though important, none of the intervention studies had assessed effective coping of OS and an outcome measure, making this a unique feature of the present study.

Advocating for the support of school principals and allocating time for the intervention during working

hours, organizing repeat sessions for those who missed the initial sessions, regular communications or reminders via mobile text messages to social media groups as well as post session thanking notes and messages, and monitoring the attendance greatly improved the compliance and minimized loss to follow up. Distributing the learning material ensured active participation of the teachers during the session and improved compliance during school. When considering the duration of the intervention in studies included in the systematic review (5), majority (n=27; 93.1%) have been conducted for less than or equal to six months with the post assessments being conducted one month after the completion of the intervention (17-18).

Based on the evidence of the present study, the intervention package which used CB intervention and relaxation interventions has been effective for reducing OS and psychological distress as well as to improve healthy lifestyles and coping abilities.

Limitations of the study

The post-assessment was performed one month

following the intervention package. Though it does not affect the assessment of the effectiveness, it does not provide evidence of the long-term sustainability of the effectiveness. The aspects of logistic and financial feasibility of conducting the intervention were not assessed in the present study. Lifestyle related outcomes may have been subjected to reporting bias following the increased awareness of those after the intervention.

Conclusions & Recommendations

The intervention package developed to reduce OS among secondary teachers in Sinhala medium government schools in the district of Colombo was found to be effective. The package was also proven to be effective in reducing psychological distress, increasing knowledge on OS and effective coping of OS and improving healthy lifestyle behaviours that supported stress reduction. It is recommended that basic/in-service teacher training programmes by the Ministry of Education or the School Health Programme of the Ministry of Health serve as the channel for delivering the interventional package.

Public Health Implications

- The newly developed intervention package was effective, and the interventional activities were shown to bring about benefits of public health importance in terms of reducing OS, psychological distress, improving effective coping of OS and healthy lifestyle behaviours. It is recommended to be incorporated to the basic training of teachers or implemented through the school health programme.

Author Declarations

Competing interests: The authors declare that they have no competing interests.

Ethics approval and consent to participate: Ethical approval was obtained from the Ethical Review Committee, Faculty of Medicine, University of Colombo, Sri Lanka (EC-18-126). Informed written consent was obtained from all the study participants prior to data collection.

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Author contributions: BD was primarily responsible for intervention implementation, in collaboration with DS, NG, MD and the team. BD was responsible for overall research management. MD, DS, NS contributed to intervention content. BD, DS, NG & MD drafted the

manuscript, and all authors contributed to manuscript editing and read and approved the final manuscript.

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