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Impact of Educational Intervention in Reducing NCD Risk Factors

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Abstract:

Introduction: *Bangladesh is passing through an epidemiological transition from communicable diseases to non-communicable diseases.*

Objectives: *To measure the impact of educational intervention in reducing noncommunicable (NCD) risk factors.*

Methodology: *A cross-sectional study done among 378 working people selected randomly in different gov't and nongov't institutions/offices in Dhaka city. Data were collected by through pre tested questionnaire cum checklist.*

Result: *Majority were male 307 (81.2%) and mostly aged 34-44 years 168 (44%). One fourth 99 (26.2%) had graduation level education. More than half 227 (60%) nature of job were involved with mental effort. Nearly half had monthly family income ranging from Taka 10,001-20,000 180 (47.6%). Mostly 110 (29.1%) had family history hypertension. Educational intervention had positive impact after intervention in reducing almost all parameters of behavioral risk factors namely tobacco, alcohol, unhealthy diet and physical inactivity ($p<0.05$) and also found highly significant for increasing the knowledge and awareness of the participants regarding NCD risk*

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factors (p<0.001). In terms of BMI, no changed found among underweight but the proportion of normal BMI increased to 138 (36.5%) and the proportion of overweight and obese decreased to 170 (45%) and 61 (16.1%) respectively. The change was statistically significant (p=0.001). The educational intervention had a small impact to reduce the mean systolic and diastolic blood pressure by 2.077±5.87 and 1.190±4.109 respectively. However this change was statistically significant (p=0.001).

Conclusion: *Educational intervention is an effective measure to reduce the NCD risk factors and to combat the growing burden of noncommunicable diseases in a low resource setting like Bangladesh.*

Key words: Noncommunicable diseases, NCD risk factors, educational intervention and epidemiological transition.

INTRODUCTION:

NCDs in developing countries are a major public health problem and socioeconomic problem.[1] Bangladesh has been experiencing an epidemiological transition from communicable diseases to non-communicable diseases. Non-communicable diseases are a heterogeneous group that includes major causes of death, such as heart diseases, diabetes and cancer, and disability, such as mental disorders.[2] NCDs are important cause of disease burden, morbidity and mortality. At least 25% of the deaths in primary and secondary government health facilities are caused by these diseases. [3]. Tertiary level hospital data indicate that cardiovascular diseases have already appeared as one of the leading causes of mortality. The Health, Nutrition, Population Sector Programme (HNPSP) has identified three NCDs-cancer, cardiovascular diseases and diabetes mellitus-as major public health problems [(4)]. Presently, Bangladesh does not have a community-based public health program for NCDs. Only hospital-based information, although poor, is available [5].Globally, non-communicable diseases

(NCDs) are increasingly recognized as a major cause of morbidity and mortality. Chronic, noncommunicable diseases are responsible for 60% of all deaths globally [(6).] The leading cause of NCD deaths in 2008 was cardiovascular diseases (17 million deaths, or 48% of NCD deaths) and it was responsible for the largest proportion of NCD deaths under the age of 70 (39%) most of which were contributed from low and middle income countries like Bangladesh [6-8] A population based study in rural Bangladesh conducted to see the prevalence of IHD revealed a higher prevalence (18.6%) of hypertension as compared to the others study[9]. Especially in developing countries, the burden of chronic diseases is increasing rapidly and will have significant social, economic, and health consequences. Eighty percent of the total deaths due to NCDs occur in developing countries. By 2020, these figures are expected to rise to 73% and 60%, respectively [10, 11].The countries of the South-East Asia Region are thus facing a double burden, with a heavy load of infectious diseases and an increasing burden due to NCDs [12]. While not discounting the inevitability of death, the evidence indicates that non-communicable diseases often cause death prematurely, usually after years of increasing disability and ill health [13]. Objective measurement of burden of disease and death following standard definitions are needed. Common risk factors underlie non-communicable diseases. An estimated 80% of premature heart disease, stroke and type 2 diabetes, and 40% of cancer, could be avoided through healthy diet, regular physical activity, and avoidance of tobacco use. [14] Globalization and urbanization serve as conduits for the promotion of unhealthy lifestyles (e.g. tobacco and alcohol use, unhealthy diets, and physical inactivity) and environmental changes (e.g. indoor and outdoor air pollution). These common risk factors give rise to intermediate risk factors such as raised blood pressure, raised blood glucose, unhealthy lipid profiles, obesity and impaired lung function. In turn, the intermediate risk factors predispose individuals to the "fatal

four" – cardiovascular disease (heart disease and stroke), cancer, chronic respiratory disease and diabetes [15]. Bangladesh is currently facing a dual burden, with a huge load of infectious diseases and an increasing burden due to chronic non-communicable disease [16].The overall mortality rate in Bangladesh has decreased significantly over the couple of decades. But deaths due to chronic diseases are increasing in an alarming. There is hardly anyone without a risk factor, 98.7% have at least one risk factor rate [17]. Most of these major risk factors of NCDs in Bangladesh are related to lifestyle. Tobacco use is an important risk factor for several NCDs. According to Global Adult Tobacco Survey 2009 Bangladesh [18], smoking prevalence among adult aged over 15 years is quite high (23%). Unhealthy diet is another key risk factor although fruit and vegetables are included in people's diet; however the amount they consume on an average is far less in terms of required serving. According to NCD risk factor survey 2010 [17], the overall daily per capita consumption of fruit was 1.7 servings and of vegetables 2.3 serving against their minimum daily requirement of 5 servings. Considering the cutoff as minimum recommended amount, 95.7% don't consume adequate fruit or vegetables on an average day. Physical inactivity, particularly among female and urban residence is low. Sedentary lifestyle in urban population is a major risk factor. According to NCD survey report 2010, prevalence of low level of physical activity is quite high (27%). Although under nutrition is a major concern in sections of population, around one fifth (18%) of the adult population were reported to be overweight and the proportion is higher in women (22%) [17]. In 2007, it was estimated that NCDs would be responsible for 59% of deaths by 2010 compared to 40% in 1990 [16]. So it reflects that NCDs have already appeared as a major public health problem in Bangladesh and this situation can be explained by existence of globalization, poorly planned urbanization, and environment and lifestyle factors. For this current educational interventions

will help policy orientation: population-based interventions within the community. The result of this study will focus the necessity of primary prevention of NCDs through determining impact of Educational intervention towards change in NCDs risk factors.

METHODOLOGY:

This study was a **c**ommunity trial (Before and after comparison study without control) done among randomly selected both men and women in the age range of 25-64 years, working in selected public and private organizations in Dhaka. Calculated sample size is 251 with power of 80% at 5% significant level in two-sided test where P1 is assumed to be 15%, and P2 = 25 % . However a total of 300 were taken in consideration of additional 15 % as non-response rate and probability of data loss in the cleaning process. Interventions were given for 03 months as counseling and educational booklet focusing on reduction of risk factors for non-communicable diseases. Measurements of anthropometric parameters were done by using measuring tapes, weighing machines, blood pressure machine, stethoscope etc. Face to Face interview by questionnaire and recording anthropometric and blood pressure measurements by checklist. Pretesting of the research instrument was done before finalization. Data analysis was done using SPSS version 16.

RESULT

The study was carried out among 378 working people in different gov't and nongov't institutions/offices in Dhaka city to measure the impact of educational intervention in reducing noncommunicable (NCD) risk factors namely behavioral risk factors (tobacco, alcohol, unhealthy diet and physical inactivity), anthropometric indicator/body mass index and blood

pressure. Data were analyzed using statistical package 16.0 version. This chapter deals with statistical analysis and presentation of the information. The results of the study are being planned to present in tabular form and narrative form are mentioned below.

Table 1 show that among the 378 respondents 307 (81.2%) were male and 71 (18.8%) were female. Most of the respondents' were in the age group of 34-44 years 168 (44%), followed by 25-34 years 40 (10%), 45-54 years 136 (36%), 55-64 years 34 (9%). Most of the respondents 99 (26.2%) had graduation level education followed by 94 (24.9%) had higher secondary certificate, 80 (21.2%) had masters and above, 67 (17.7%) had secondary school certificate and 38 (10.1) had junior school certificate level of education. Nearly half of the 188 (49.7%) of the respondents were government employee and 99 (26.2%) were non government employee, 66 (17.5) were businessman, 25 (6.6%) were technician. Majority of the respondents 325 (86%) pattern of job were Office/Institutional based job and 53 (14%) were holding Field based job. More than half of the respondents' 227 (60%) nature of job were mostly involved with mental effort and 151 (39%) were mostly involved with physical effort. Nearly half of the respondents had monthly family income ranging from Taka 10,001-20,000 180(47.6%) followed by Taka 2001-10,000 108(28.6%), Taka 20,000-30,000 53(14%) and 37(9.8%) had monthly family income Taka 30000 and above.

Table 2 shows that out of 278 respondents 110 (29.1%) had family history hypertension followed by 78 (28.1%) having diabetes mellitus, 41 (14.7%) having heart disease, 20 (7.2%) had chronic respiratory disease, 19 (6.8%) having asthma and 10(3.6%) had family history cancer.

Table 3 shows that among the 378 respondents current smoker before intervention was 93(24.6%) and after intervention it was 74(19.6%) and changes found in 19(5%) persons. The change was significant (p=0.001).

The mean number of sticks/day smoked was 10.6±6.3 before intervention and 7.1±4.9 after intervention and mean changes found 3.5±3.2. The change was significant (p=0.001).

Out of 378 respondents only 10 (2.6%) had history of alcohol consumption where no change occurred after intervention.

Table 4 shows that Fifty respondents (13.2%) used smoked smokeless tobacco (Betel nut, Jarda, Gull) before intervention and after intervention it reduced to 35(9.3%) and mean changes found among 15(3.9%) persons. The change was significant (p=0.001).

Regarding number of betel nut used/day the mean was 6.18±5.35 before intervention and 4.44±3.3 after intervention and mean changes found 1.74±2.7. The change was significant (p=0.001).

Table 5 shows that the mean of fruits consumption days/week was 1.83±1.41 before intervention and after intervention it was 2.4±1.4 and mean changes found 0.53±0.83. The change was significant (p=0.001). Regarding number of fruits servings/day the mean was 1.18±0.54 before intervention and 3.1±1.3 after intervention and mean changes found 1.9±1.2. The change was significant (p<0.005). The mean of vegetables consumption days/week was 4.2±1.6 before intervention and after intervention was 4.6±1.5 and changes found 0.44±0.7. The change was found significant (p=0.001). Regarding number of vegetables servings/day the mean± SD was 2.02±0.93 before intervention and 2.8±1.2 after intervention and mean changes found 0.81±1.00. The change was significant (p=0.001). Out of 378 respondents 370 (97.9%) did not maintain recommended

vegetable intake that is at least 5 servings/day for 5days/week before intervention and 345(91.3%) did not maintain recommended vegetable intake after intervention and mean changes found 25(6.6%). The change was significant (p=0.001). Out of 378 respondents 295(78%) had history of taking table salt before intervention and after intervention 260(68.8%) had history of taking table salt. The mean change of less intake of table salt found among 18(4.8%) respondents. The change was not significant (p=0.001). The mean of red meat consumption days/week was 1.31±0.57 before intervention and after intervention it was 1.31±0.53 and mean changes found 0.35±0.18. The change was not significant (p>0.005). Regarding number of red meat servings/day the mean was 1.5±0.50 before intervention and 1.46±0.50 after intervention and mean changes found 0.41±0.20. The change was not significant (p>0.005). Shows that among the 378 respondents that regarding uses of Vegetable oil 13(3.4%), Soybean oil 348(92.1%), Butter or ghee 5(1.3%), Margarine 2(0.5%), Mustard oil 8(2.1%), none in particular 2(b0.5%) before intervention and after intervention was Vegetable oil 24(6.2%), Soybean oil 340(90.0%), Butter or ghee 4(1.0%), Margarine 3(.08%), Mustard oil 5(1.4%), none in particular 2(0.6%) and changes found 11(2.8), 7(2.1), 1(0.3), 1(0.3), 3(0.7) and 0 (0) change respectively. The change was not significant (p>.005). Regarding habit of taking outside food out of 378 respondents majority 281(74.3%) do not take outside food before intervention and after intervention it increased to 299(79.1%) and mean changes found among 18(4.8%). The change was significant (p=0.001).

Table 6 shows that regarding physical exercise the mean days/week of exercise performed was 5.10±1.47 before intervention and after intervention was 5.61±1.03 and mean changes found 0.51±0.84. The change was significant (p=0.001). The mean of physical exercise duration (min)/day was 46±26.4

before intervention and after intervention was 50±27 and mean changes found 3.5±16.8. The change was not significant (p=0.001). Out of 378 respondents 292 (77.2%) did not maintained recommended physical exercise that is at least 150 minute at least 5days/week before intervention and 239(63.2%) found not maintained recommended physical exercise after intervention and mean changes found in respondents 53(14%). The change was significant (p=0.001). Out of 378 respondents regarding preference of using stairs 161(42.6%) always used elevator, 34(9%) mostly used elevator, 101(26.7%) always used stairs, 51(13.5%), mostly used stairs and 31(8.2%) used both equally before intervention and 44(11.6%)always used elevator, 29(7.7%)mostly used elevator, 166(43.9%) always used stairs, 102(27%), mostly used stairs and 37(9.8%) used both equally after intervention. The changes found among 117(31%), 5(1.3%), 65(17.2%), 51(13.5%) and 6(1.6%) respectively. The changes was significant (p=0.001). Out of 378 respondents regarding preference of traveling for short distance (minimum 5-10 mins walking distance) 80(21.2%) always on foot, 52(13.8%) mostly on foot, 77(20.4%) always on vehicle, 135(35.7%) mostly on vehicle and 34(9.0%) use both equally before intervention and 168(44.4%) always on foot, 72(19%) mostly on foot, 39(10.3%) always on vehicle, 55(14.6%) mostly on vehicle and 44(11.6%) use both equally after intervention. The changes found 88(23.2%), 20(5%), 38(10.1%), 80(21.1%) and 10(2.6%) respectively. The changes was significant (p=0.001). Regarding involvement in household activities among 378 respondents 152(40.2%) not at all, 120(31.7%) rarely and 106(39%) frequently involved in household activities before intervention and 113(29.9%) not at all, 81(21.4%) rarely, 184(48.7%) frequently involved in household activities after intervention. The changes was found among 39(10.3%), 39(10.3%) and 78(9.7%) respectively. The changes was significant (p=0.001).

Table 7 it shows that out of 378 respondents regarding awareness of meaning of non communicable disease 118(31.2%) gave satisfactory answer and 260(68.8%) did not give satisfactory answer before intervention and 276(73%) gave satisfactory answer and 102(27%) did not give satisfactory answer after intervention. The change was found among 158(41.8%). The change was found significant (p=0.001). Regarding awareness of difference between communicable diseases & NCDs 110(29.1%) gave satisfactory answer and 268(70.9%) did not give satisfactory answer before intervention and 298(78.8%) gave satisfactory answer and 80(21.2%) did not give satisfactory answer after intervention. The change was found among 188(49.7%). The change was found significant (p=0.001). Regarding knowledge about present situation or burden of NCDs in Bangladesh 14(3.7%) knew and 364(96.3%) did not knew before intervention and 352(93.1%) knew and 26(6.9%) did not know after intervention about present situation or burden of NCDs in Bangladesh. The change found among 338(89.4%). The change was found significant (p=0.001). Regarding proportion of NCDs contributes to total deaths in Bangladesh 378(100%) did not know before intervention but it reduced to 25(6.6%) and change was 94.4% and it statistically significant (p=0.001). Out of 378 respondents regarding major NCDs commonly reported in our countries 110(29.1%) mentioned one NCD, 181(47.7%) mentioned two NCD, 66(17.5%) mentioned three and 21(5.6%) mentioned four NCD before intervention and 24(6.3%) mentioned two, 135(35%) mentioned three and 219(57.9%), mentioned four NCD after intervention. The change was found among 157(41.4%) mentioned two, 69(17.5%) mentioned three and 198(52.3%) mentioned four. The change was found significant (p=0.001). Regarding common risk factors of major NCDs 107(28.3%) mentioned one risk factor, 190(50.3%) mentioned two risk factor and 81(21.4%) mentioned three risk factor before intervention and 39(7.9%) mentioned one Risk factor, 95(25.1) mentioned

two risk factor and 253(66.9%) mentioned three risk factor after intervention. The change was found among 68(20.4%) mentioned one, 95(20.2%) mentioned two and 172(45.5%) mentioned three risk factor. The change was found significant (p=0.001).

Table 8 shows that regarding statement of Chronic NCD are mainly affecting high income countries out of 378 respondents 298(78.8%) agreed and 80(21.2%) disagreed before intervention and 17(4.5%) agreed and 361(95.5%) disagreed after intervention. The change found among 281(74.3%) respondents. The change was found significant (p=0.001). Regarding statement of Chronic diseases mainly affect old people out of 378 respondents 371(98.1) agreed and 7(1.9%) disagreed before intervention and 31(8.2%) agreed and 347(91.8%) disagreed after intervention. The change found among 353(93.3%) respondents. The change was found significant (p=0.001). Regarding statement of Chronic diseases are mainly the result of having family history out of 378 respondents 286(75.7%) agreed and 92(24.3%) disagreed before intervention and 24(6.3%) agreed and 354(93.7%) disagreed after intervention. The change found among 262(69.4%) respondents. The change was found significant (p=0.001). Regarding statement of Chronic diseases can't be well prevented out of 378 respondents 245(64.8%) agreed and 133(35.2%) disagreed before intervention and 43(11.4%) agreed and 335(88.6%) disagreed after intervention. The change found among 202(53.4%) respondents. The change was found significant (p=0.001). Regarding statement of NCDs prevention & control is too difficult and expensive out of 378 respondents 328(86.8%) agreed and 50(13.2%) disagreed before intervention and 24(6.3%) agreed and 354(93.7%) disagreed after intervention. The change found among 304(80.5%) respondents. The change was found significant (p=0.001).

Table 9 shows regarding BMI out of 378 respondents 9 (2.4%) were found underweight, 104 (27.5%) Normal, 189 (50.0%) Overweight, and 76 (20.1%) Obese before intervention and 9 (2.4%) underweight, 138 (36.5%) normal, 170 (45%) overweight, and 61 (16.1%) obese after intervention. The changes found among them were 0%, 34 (9%), 19 (5%), and 15 (4%) respectively. The change was found significant (p=0.001). As regards status of blood pressure, out of 378 respondents 254 (67.2%) was Normotensive and 124 (32.8%) was Hypertensive. Regarding Systolic blood pressure among 378 respondents the Mean was 115.21±15.001 before intervention and 113.13±12.856 after intervention. The change of mean found 2.077±5.87. The change was significant (p=0.001).

Regarding Diastolic blood pressure among 378 respondents the Mean was 77.51±11.078 before intervention and 76.32±9.959 after intervention. The change of mean found 1.190±4.109. The difference was found significant (p=0.001).

DISCUSSION:

This study was done to measure the impact of educational intervention in reducing noncommunicable (NCD) risk factors namely behavioral risk factors (tobacco, alcohol, unhealthy diet and physical inactivity), anthropometric indicator (body mass index) and blood pressure. This study was also intended to measure the change of awareness regarding NCDs among the respondents after educational intervention. The study population was the working people in different gov't and nongov't institutions/offices in Dhaka city. Study subjects were selected randomly. Population of both sexes in the age range 25-64 years was selected for educational intervention. Results of the study are presented as per the objectives of the study.

Socio demographic characteristics of the study population were presented in table no. 1:

It was found that Eighty one percent of the respondents were male and only 19 percent of the respondents were female. This is obviously because of the fact that more males are service holders in comparison to women in Bangladesh.

Majority of the respondents (80.4%) belonged to the age group of (35-44) and (45-54) years .And the mean age of the respondents was 42.8 years with SD ±8.1 years. It shows that the majority of the study population is in economically productive age group.

Education is the key determinant of life style and status an individual enjoys in a society. Quarter of the respondents (27.8%) had education up to secondary school certificate and more than half (51.1%) had combined of higher secondary and graduation level. Only 21.2% were found with master and above level of education. As the respondents were employees of the different gov't. and non gov't offices almost all of them were educated. However no comparison could be made with general population of Bangladesh because of the fact that the study subjects are different from the general population.

Monthly income data of the respondents is another important indicator of the socioeconomic status. The mean monthly income was Tk 18569 with SD ±7920 **(Table 1).** It seems that monthly house hold income of the respondents is fairly well compared to national household income of Tk. 11,480[18]

Family history of Chronic noncommunicable diseases in table no 2:

Majority of the respondents (89.5%) had family history of chronic noncommunicable diseases which comprised of hypertension, heart disease, diabetes mellitus, cancer, chronic respiratory diseases and asthma. This finding is logical and

expected as these diseases are contributed to 52% of total burden of disease in our country [19]

Impact of educational intervention on behavioral risk factors:

This intervention study was found effective in reducing behavioral risk factors. **Table 3** shows that the status of current smoker was reduced by 5% by educational intervention and this was found statistically significant (p=0.001). The mean number of sticks/day smoked was also reduced after intervention to 3.5±3.2 sticks/day and this change was statically significant (p=0.001). However no change occurred after intervention in reducing alcohol consumption (2.6%) status (p<0.05). The consumption of smokeless tobacco (Betel nut, Jarda, Gull) was found to reduce by 3.9% after intervention and the change of mean number of betel nut use/day was also changed by 1.74±2.7. These changes were found statistically significant (p=0.001) as shown in **table 4**. The consumption of recommended fruits and vegetables was found very low among the study subjects. The mean of fruits consumption days/week was 1.83±1.41 before intervention and after intervention it was 2.4±1.4. The change was significant (p=0.001). Regarding number of fruits servings/day, the mean was 1.18±0.54 before intervention and 3.1±1.3 after intervention and mean changes found 1.9±1.2. The change was also significant (p<0.005). The mean of vegetables consumption days/week was 4.2±1.6 before intervention and after intervention was 4.6±1.5. The change was found significant (p=0.001).Regarding number of vegetables servings/day the mean± SD was 2.02±0.93 before intervention and 2.8±1.2 after intervention. The change was significant (p=0.001). Recommended vegetable intake that is at least 5 servings/day for 5days/week was found to improve by 6.6% after educational intervention among the study subjects who did not maintained and this change was significant (p=0.001).Similarly habit of taking extra table salt was reduced

by 4.8% and this change is statistically significant (p=0.001) as shown in **table 5**. As shown in the **table 6**, a high number of 292 (77.2%) of the respondents were found not maintained recommended physical exercise (minimum 30 min of physical exercise for at 5 days a week) before intervention and but this proportion reduced to 239 (63.2%) after intervention. A total of 14% were found to engage recommended physical exercise after having intervention and this change was statistically significant (p=0.001). The mean duration (min)/day of doing physical exercise was increased but it was not statistically significant (p>0.05). Preference of using stairs increased significantly after educational intervention among the respondents who did not use stairs regularly and similar findings were also found in preference of walking for traveling of short distance (minimum 5-10 mins walking distance) and involving in household activities (p=0.001) as shown in **table 6**. Our study findings of reducing behavioral risk factors are also in line with other interventional studies where the significant changes in related behaviors (reduction in consumption of extra salt, increase in physical activity levels and in fruits and vegetable consumption, and decrease in use of tobacco products) as documented in the intervention population could have contributed to the significant reduction in blood pressure [20-25].

Consumption of red meat increases the risk of cardiovascular diseases [26].However, in this study the mean of red meat consumption days/week and mean servings number/day were less than 2 servings and 2 days in a week which can be considered as normal consumption and it was even declined a bit but not changed after intervention at significant level (p>0.005), **table 5.**

Regarding habit of taking outside fatty food was found to reduce by 4.8% and this change was statistically significant (p=0.001).

The habit of consumption of oil could not be changed by educational intervention (p>.005) as shown in **table 5.** Majority

of the respondents consumed soybean oil. This is probably due to the availability and affordability of soybean oil in our country.

Impact of educational intervention to awareness related variables regarding NCDs:

In this study we found significant improvement in responses on all awareness related variables regarding noncommunicable diseases and reduce the perception on myths of misunderstanding on noncommunicable diseases after intervention among the respondents as shown in **table 7 and 8**. It is noteworthy that different modalities have been effective at providing target audience with information health related issues including booklets [27] leaflets,[28] and a combination of booklets and videotapes,[29] as well as, to some degree, films.[30,31] . The findings of the study showed similar result with other relevant studies in increasing a significant increase in knowledge, attitude and perception on cancer regardless of clinical settings using leaflet and educational printed materials [32, 33].

Impact of Educational Intervention on Physical Measurement

Table 9 shows that there was improvement in BMI of the respondents after intervention. Before intervention 9 (2.4%), 104 (27.5%), 189 (50.0%) and 76 (20.1%) were recorded for underweight, normal, overweight and Obese respectively. After intervention no changed found among underweight but the proportion of normal BMI increased to 138 (36.5%) and the proportion of overweight and obese decreased to 170 (45%) and 61 (16.1%) respectively. The change was statistically significant (p=0.001). These study findings are similar with the study done in Nigeria [34].

As regards status of blood pressure, out of 378 respondents 254 (67.2%) were normotensive and 124 (32.8%)

were hypertensive. The educational intervention had a small impact to reduce the mean systolic and diastolic blood pressure by 2.077±5.87 and 1.190±4.109 respectively as shown in **table 9.** The difference was significant (p=0.001) and found similar with the findings of a study done by Fahey T et al where they intended to determine the effectiveness of educational and organizational strategies used to improve control of blood pressure[35] .

CONCLUSION:

Current study showed educational intervention is an effective measure to reduce the NCD risk factors. So it could be an interventional strategy to combat the growing burden of noncommunicable diseases in a low resource setting like Bangladesh.

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IMPACT OF EDUCATIONAL INTERVENTION IN REDUCING NCD RISK FACTORS

Table 1: Distribution of the respondents according to socio-demographic characteristics (N=378)

Variables	Frequency(n)	%
Gender		
Male	307	81.2
Female	71	18.8
Age		
25-34	40	10.6
35-44	168	44.4
45-54	136	36.0
55-64	34	9.0
Education		
Junior school certificate	38	10.1
Secondary school certificate	67	17.7
Higher secondary certificate	94	24.9
Graduation	99	26.2
Masters and above	80	21.2
Occupational status		
Government employee	188	49.7
Non-government employee	99	26.2
Businessman	66	17.5
Technician	25	6.6
Office/institutional based	325	86
Field based	53	14
Nature of the job/work		
Mostly involved physical effort	151	39
Mostly involved mental effort	227	60
Monthly income		
2,000-10,000	108	28.6
10,001-20,000	180	47.6
20,001-30,000	53	14
=>30,000	37	9.8

Table 2: Distribution of respondents according to Family history of chronic disease (N=378)

Variables	Frequency(n)	%
Family history of chronic disease *		
Hypertension	110	29.1
Heart disease	41	14.7
Diabetes Mellitus	78	28.1
Cancer	10	3.6

Chronic respiratory disease	20	7.2
Asthma	19	6.8

***Multiple responses**

Table 3: Distribution of respondents according to Behavioral Risk Factors (Tobacco & alcohol)

Variables	Pre-intervention n (%)	Post-intervention n (%)	Changes n (%)	p-value (McNemar)/ t-value
Smoking status (N=378)				
Current smoker	93 (24.6)	74(19.6)	5.0	0.001 (McNemar)
Number of sticks/day				
Mean± SD	10.6±6.3	7.1 ±4.9	3.5±3.2	0.001 (T-test)
Alcohol consumption status				
Yes	10 (2.6)	10 (2.6)	0.0	1.00 (McNemar)

Table 4: Distribution of respondents according to Behavioral Risk Factors (Betel nut, Zarda , Gool)

Variables	Pre-intervention n (%)	Post-intervention n (%)	Changes n (%)	p-value (McNemar)/ t-value
Status of smokeless tobacco (betel nut, Zarda, gool)				
Yes	50 (13.2)	35 (9.3)	3.9	0.001(McNemar)
Number of betel nut use/day				
Mean± SD	6.18±5.35	4.44±3.3	1.74±2.7	0.001

Table 5: Distribution of respondents according to Behavioral Risk Factors (Unhealthy diet)

Variables	Pre-intervention n (%)	Post-intervention n (%)	Changes n (%)	p-value (McNemar)/ t-value
Fruits consumption Days/week				
Mean± SD	1.83±1.41	2.4±1.4	0.53±0.83	0.001

Number of servings/day				
Mean± SD	1.18±0.54	3.1±1.3	1.9±1.2	0.001
Recommended fruits intake*				
Vegetables consumption Days/week				
Mean± SD	4.2±1.6	4.6±1.5	0.44±0.7	0.001
Number of servings/day				
Mean± SD	2.02±0.93	2.8±1.2	0.81±1.0	0.001
Recommended vegetables intake*				
Intake of table salt				
Yes	295(78)	260(68.8)	35(9.22)	0.001
Red meat consumption Days/week				
Mean± SD	1.31±0.57	1.3±0.53	.035±0.8	0.025
Number of servings/day				
Mean± SD	1.5±0.50	1.46±0.50	.041±0.0	0.14
Usage of Cook oil				
Vegetable oil	13(3.4)	24(6.2)	11(2.8)	
Soyabean oil	348(92.1)	340(90.0)	7(2.1)	0.0167
Butter or ghee	5(1.3)	4(1)	1(0.3)	
Margarine	2(0.5)	3(0.8)	1(0.3)	
Mustard oil	8(2.1)	5(1.4)	3(0.7)	
None in particular	2(0.6)	2(0.6)	0(0)	
Habit of having outside food				
No	281(74.3)	299(79.1)	18(4.8)	0.001

*At least 5 servings/day for 5 days/week

Table 6: Distribution of respondents according to Behavioral Risk Factors (Physical Inactivity) (N=378)

Variables	**Pre-intervention n (%)**	**Post-intervention n (%)**	**Changes n (%)**	**p-value (McNemar)/ t-value**
Days/week				
Mean± SD	5.10±1.47	5.61±1.03	0.51±0.84	0.001
Duration/day				
Mean± SD	46±26.4	50±27	3.5±16.8	0.023

Recommended exercise performance*				
Not maintained	292(77.2)	239(63.2)	53(14)	0.001
Preference for stairs(N=378)				
Always use elevator	161(42.6%)	44(11.6%)	117(31%)	0.001
Mostly use elevator	34(9%)	29(7.7%)	5(1.3%)	
Always use stairs	101(26.7%)	166(43.9%)	65(17.2%)	
Mostly use stairs	51(13.5%)	102(27%)	51(13.5%)	
Use both equally	31(8.2%)	37(9.8%)	6 (1.6%)	
Preference of traveling for short distance (minimum 5-10 mins walking distance)				
Always on foot	80(21.2%)	168(44.4%)	88(23%)	0.001
Mostly on foot	52(13.8%)	72(19%)	20(5%)	
Always on vehicle	77(20.4%)	39(10.3%)	38(10%)	
Mostly on vehicle	135(35.7%)	55(14.6%)	80(21.1%)	
Use both equally	34(9.0%)	44(11.6%)	10(2.6%)	
Involvement in HH activities				
Not at all	152(40.2%)	113(29.9%)	39(10.3%)	0.001
Rarely	120(31.7%)	81(21.4%)	39(10.3%)	
Frequently	106(39%)	184(48.7%)	78(9.7%)	

*At least 150 min/5 day/week.

Table 7: Distribution of respondents according to Awareness related variables regarding NCDs. (N=378)

Variables	Pre-intervention n (%)	Post-intervention n (%)	% of changes	p-value (McNemar)/ t-value
Meaning NCD				
Satisfactory	118(31.2%)	276(73%)	158(41.8%)	0.001
Not satisfactory answer	260(68.8%)	102(27%)	158(41.8%)	
Difference between communicable				

diseases & NCDs				
Satisfactory	110(29.1%)	298(78.8%)	188(49.7%)	
Not satisfactory	268(70.9%)	80(21.2%)	188(49.7%)	
Know about present situation or burden of NCDs in Bangladesh				
Yes	14(3.7%)	352(93.1%)	338(89.4%)	0.001
No	364(96.3%)	26(6.9%)	10(89.4%)	
Proportion of NCDs contributes to total deaths in Bangladesh				
Don't know	378(100%)	25(6.6%)	353(93.4%)	
Major NCDs commonly reported in our countries				
Mentioned one NCD	110(29.1%)	0	0	0.001
Mentioned two	181(47.7%)	24(6.3%)	157(41.4%)	
Mentioned three	66(17.5%)	135(35%)	69(17.5%)	
Mentioned four	21(5.6%)	219(57.9%)	198(52.3%)	
Common risk factors of major NCDs				
Mentioned one Risk factor	107(28.3%)	39(7.9%)	68(20.4%)	0.001
Mentioned two Risk factor	190(50.3%)	95(25.1)	95(20.2%)	
Mentioned three Risk factor	81(21.4%)	253(66.9%)	172(45.5%)	

Table 8: Distribution of respondents according to awareness regarding myths on NCDs. (N=378)

Variables	Pre-intervention n (%)	Post-intervention n (%)	% of changes	p-value (McNemar)/ t-value
Mainly affecting high income countries				
Agree	298(78.8%)	17(4.5%)	281(74.3%)	

Disagree	80(21.2%)	361(95.5%)	281(74.3%)	0.001
Chronic diseases mainly affect old people				
Agree	371(98.1)	31(8.2%)	340(89.9%)	0.001
Disagree	7(1.9%)	347(91.8%)	340(89.9%)	
Chronic diseases mainly affect rich people				
Agree	374(98.9%)	21(5.6%)	353(93.3%)	0.001
Disagree	4(1.1%)	357(94.4%)	353(93.3%)	
Chronic diseases are mainly the result of having family history				
Agree	286(75.7%)	24(6.3%)	262(69.4%)	0.001
Disagree	92(24.3%)	354(93.7%)	262(69.4%)	
Chronic diseases can't be well prevented				
Agree	245(64.8%)	43(11.4%)	202(53.4%)	0.001
Disagree	133(35.2%)	335(88.6%)	202(53.4%)	
NCDs prevention & control is too difficult and expensive				
Agree	328(86.8%)	24(6.3%)	304(80.5%)	0.001
Disagree	50(13.2%)	354(93.7%)	304(80.5%)	

Table 9: Distribution of respondents according to Physical measurement

Variables	**Pre-intervention n (%)**	**Post-intervention n (%)**	**% of changes**	**p-value (McNemar)/ t-value**
BMI				
Underweight	9 (2.4%)	9 (2.4%)	0%	

Normal	104 (27.5%)	138 (36.5%)	34 (9%)	0.001
Overweight	189 (50.0%)	170 (45%)	19 (5%)	
Obese	76 (20.1%)	61 (16.1%)	15 (4%)	
Hypertension				
Normotensive	254 (67.2%)	254 (67.2%)		
Hypertensive	124 (32.8%)	124 (32.8%)		
Blood Pressure Systolic Blood pressure				
Mean±SD	115.21±15.001	113.13±12.856	2.077±5.871	0.001
Diastolic Blood pressure				
Mean±SD	77.51±11.078	76.32±9.959	1.190±4.109	0.001