Effectiveness of health literacy intervention on cardiovascular diseases among university students of Pakistan

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Abstract

Background: Global burden of cardiovascular diseases is alarming which is intricately linked with health literacy. To what extent improvement in health literacy can lower down cardiovascular diseases occurrence has not yet properly documented. This study focused on assessing the knowledge and existing lifestyle behavior about cardiac diseases among university students. We further aimed to improve this awareness after imparting an educational intervention among undergraduate non-medical students to sensitize them about risk factors.

Method: A pre and post approaches with cross sectional study design was conducted in University of Gujrat during April–September 2017. Using structured questionnaire comprising of response items about hypertension, heart attack, stroke and preventive practices, data was randomly collected from students (n = 100). Survey respondents were also given a lecture regarding cardiovascular diseases awareness and a post test evaluation was also conducted on same group of students.

Results: With response rate of 86.95%, mean age of participating students was 21.2 (SD ± 1.34) years. Female students comprised of 53% out of which 57% were from rural background. Assessment of cardiovascular disease knowledge revealed maximum mean pre test score 30.53 (SD ± 7.61) and for post test 40.65 (SD ± 4.34) (p < 0.00). Mean score for using preventive practices was 13.02 (SD ± 2.97) for pre test whereas for post test it was 14.09 (SD ± 2.90) (p < 0.00). Intervention impact was significant on hypertension related complications (p < 0.00), symptoms of heart attack (p < 0.000), symptoms of stroke (p < 0.000) and preventive practices (p < 0.00).

Conclusion: Findings presented here show a fair degree of awareness among university students about study title prior to any educational intervention. However, by attending educational session, a significant increase in the positive lifestyle behavior and knowledge was noticed. We conclude that health promotion activities in educational institutes to sensitize students can bring rational changes in Pakistani society to promote healthy behavior and minimize cardiovascular disease risks.

Keywords: Health literacy, College students, University students, Cardiovascular diseases, Heart attack, Symptom and stroke
Background
Health Literacy (HL) is the degree to which people are able to access, understand, appraise and communicate information to engage with demand of different health contexts in order to promote and maintain good health across the life course [1]. It has been repeatedly shown in different studies that health literacy in general is lower that related to the poor health outcomes in Pakistan [2–4]. About 17.9 million deaths reported due to cardiovascular diseases (CVD) in 2016, which contributes about 31% global mortality and major causes of death were heart attack and stroke [5]. However, the number of deaths would be increased by 23.3 million in next ten years [6]. Low and middle-income countries contribute nearly 82% in CVD related mortality due to their poor fragile health system and health illiteracy [5]. Hypertension is the major contributor of CVD and its complications are responsible for 9.4 million deaths every year [7]. Almost half of the deaths in Eastern Mediterranean Region (EMRO) occurs due to CVD results in major economic loss [8].

Pakistan reported 19% of total mortality due to CVD [9, 10]. Poor health literacy on prevention and control of CVD results in high mortality [3]. Hence, the health awareness and education plays a vital role in decreasing the burden of cardiovascular diseases. This would enhance the skills among patients to prevent and live better with cardiac problems and adopt their healthy lifestyles. Self-management of cardiac diseases could be learned through effective health education that improves their communication and self-confidence on management [3]. Though, this problem is prevailing in our masses but the younger population studying in colleges and universities might play a vital role by getting the proper information and strategies on management of cardiac diseases. They will play a vital role in further dissemination this information and helps in getting healthy behaviors during early adulthood. Study recommends that the health education among youth could reverse the burden of cardiac mortality among general public [11]. To what extent awareness is needed to help people to transform their daily lifestyle practices and modifying their behavior is uncertain. Further studies are required in urban and rural areas of the country to engage people in self-management through health literacy (HL). In the context, a study was designed to assess level of CVD knowledge among non-medical students and evaluate the effectiveness of educational intervention by focusing behavioral factors that has potential to improve health literacy. We aimed to bring positive changes among young students through cost effective methods of communication and see whether increasing HL enables the students to become sensitive against CVD risk factors.

Methods
Study design
A cross sectional study design with pre and post intervention was conducted in 2017 by including undergraduate, non-medical students from only public university of Gujrat located in the Punjab province of Pakistan.

Sampling and tool
A proportion sample size calculation formula was used to calculate the sample size of 100 students by adopting the stratified sampling technique based on their department and academic year of study. Overall 115 students were selected randomly from the enrollment registers and all were included in pretest. However, only 100 were successful to complete this intervention hence, the response rate was (87%). Two measurements, before and after was conducted by interviewing the students on adopted, pretested, piloted, validated tool [6, 12, 13]. Pretesting was conducted by interviewing ten university students from adjacent district.

Data analysis
Descriptive statistics was performed for sociodemo graphic variables were analyzed by using SPSS version 23 for frequency and percentages and knowledge level was measured in two levels; yes and no. Variables on hypertension had 12 questions with score 0–29, heart attack symptoms had 8 question with score 0–8, stroke symptoms had 4 questions with score 0–8, health literacy had 8 questions with score 0–53, preventive practices variables had 8 questions scored from 5 to 22 (low to high). Frequencies with percentages were obtained for each question (pre and post) then mean scoring of pre test was compared to mean scoring of posttest of each question in each section and looked for statistical significance on paired t-test. Total mean score of each variable was obtained and compared with respective posttest mean score. In the last overall total knowledge’s mean score of pre and posttest was compared for statistical significance. Preventive practices were also analyzed in the same manner and compared for statistical significance.

Intervention
Educational intervention consisted on 90 min session was given The content of session was on CVD risk factors (modifiable and non-modifiable), epidemiology of CVD, normal and high measurements of hypertension (HTN), its complications, medication, epidemiology and symptoms of heart attack, symptoms of stroke and preventive practices about knowing their usual BP, use of salt and fats intake, physical activity and its frequency, smoking habit of sample students and information.
seeking behavior. Baseline assessment was performed prior to start this intervention and end line data were collected after the intervention.

Results
Baseline data was obtained from 115 students and 100 were finally completed the end assessment with response rate of (87%). Socio-demographic characteristics of the participants can be seen in Table 1. The mean age of students was (21, 1.34 ± SD) years, above half (53%) students were females out of which (57%) were residing in rural areas. Around (58%) fathers of the respondents were educate at least twelve years of schooling and their average income was 200–300 US $. Media was the dominant source of information regarding CVD followed by family/friends, teachers, doctors and other sources. The intervention had a positive significant effect ($p < 0.05$) after the training on their knowledge in different variables presented in (Table 2). Overall mean score showed significant difference between pre and post-test scores. In baseline mean score obtained was (31, SD ± 7.6) which has increased to (41, SD ± 4.3) in post-test; the average change and intervention effect was 10. All the variables have improved after the intervention (Table 3).

Discussion
Health literacy is an important intervention in protecting public from chronic diseases; hence poor HL among

| Table 1 | Socio-demographic characteristics of the participants
| Variables | Frequency (%) |
|----------|--------------|
| Gender   |              |
| Male     | 47 (47)      |
| Female   | 53 (53)      |
| Age      |              |
| 18–25 years | 100 (100)  |
| Mean age | 21           |
| Place they belong |          |
| Urban    | 43 (43)      |
| Rural    | 57 (57)      |
| Father’s Educational Level |          |
| Illiterate | 2 (2)       |
| 12 years schooling | 58 (78) |
| Graduation | 28 (28)     |
| Post-graduation | 12 (12) |
| Father’s Monthly income |         |
| < 200 US $ | 44 (44)     |
| < 500 US $ | 34 (34)     |
| > 500 US $ | 22 (22)     |
| Source of information on CVD |          |
| Media    | 45 (45)      |
| Family and friends | 21 (21) |
| Teachers | 15 (15)      |
| Books, news and seminars | 14 (14) |
| Health Professional | 5 (5)     |

| Table 2 | Participant’s Health information about cardiac diseases
| Variables | Pre-test (%) | Post-test (%) | $p$-value |
|----------|--------------|---------------|-----------|
| Health knowledge on Blood Pressure |              |
| Normal BP is 130/80 mmHg | 60 | 86 | < 0.05 |
| Normal BP is 160/100 mmHg | 63 | 85 |   |
| High BP can cause stroke | 57 | 84 |   |
| High BP can cause heart attack | 75 | 90 |   |
| High BP can cause kidney problem | 30 | 62 |   |
| High BP can cause eye problems | 22 | 56 |   |
| BP usually lasts for long time | 49 | 63 |   |
| Losing weight usually makes BP | 58 | 74 |   |
| Eating less salt normalize BP | 53 | 72 |   |
| High BP need medicine | 45 | 56 |   |
| Symptoms in high BP | 10 | 37 |   |
| High BP is dangerous | 10 | 31 |   |
| Information about cardiac attack symptoms |              |
| Sudden trouble | 25 | 63 | < 0.05 |
| Symptoms are same in Male and female | 59 | 82 |   |
| Feeling weak, light headed or faint | 21 | 58 |   |
| Turning gray or pale | 38 | 56 |   |
| Chest pain that radiate towards shoulder, jaw and arm | 77 | 91 |   |
| Difficulty in breathing or shortness of breath | 63 | 80 |   |
| Stress | 10 | 60 |   |
| Diabetes | 57 | 83 |   |
| Sudden trouble in speaking and confusion | 46 | 59 |   |
| Sudden dizziness, trouble walking and loss of balance | 57 | 72 |   |
| Sudden weakness or numbness of face, arm or leg | 43 | 80 |   |
| Sudden trouble seeing in one or both eyes | 24 | 68 |   |
| Health practices related variables |              |
| Check your usual Blood pressure | 41 | 55 | < 0.05 |
| Add salt to your meals | 67 | 48 |   |
| Avoid eating fat rich food | 33 | 30 |   |
| Physical activity | 74 | 78 |   |
| Smoking | 16 | 16 | > 0.05 |
| Body weight (BMI) is appropriate | 33 | 42 | < 0.05 |
| Interested to know about CVD | 48 | 53 |   |

The community would results significant morbidity, mortality and other health complications [3]. This study has clearly shown that mortality and morbidity by CVD can
be reduced by the effective awareness intervention. Varying HL levels found in our survey group manifest a large number of CVD risk factors that could be treated if diagnosed earlier. Hence, this study has highlighted the value of HL awareness campaign among university students. Areas where access to health facilities is limited, the high priority to increase HL would become the only solution to promote health [3].

Findings of this study showed considerably low level of awareness about hypertension related information and symptoms of stroke that believed HL intervention is required in specific direction. Specific intervention for the raising HL among students showed a significant changes after posttest assessment. As we assessed from our study, the knowledge of participants raised after a simple educational intervention. A substantial improvement was observed in questions about symptoms of stroke, complications of HTN on kidneys and eyes, HTN as a silent killer and taking stress as most important cause of heart attack which further confirms that educated community such as university students or people with college education or higher can be used as targeted community groups for specific health intervention. In some studies, interventions in terms of information and training showed positive change in cardiovascular parameters in different age groups. Study supported to our findings with remarkable changes in knowledge level, attitudes and behavior of school boys regarding health physical activities which contributes heart attack prevention [14]. Several other reports have demonstrated that interactive lectures and informative session with students could bring considerable improvement in health literacy [15]. Other study launched a holistic approached intervention to improve physical activity, environment and healthy food for three years and claimed that Body Mass Index (BMI) and fitness has considerably improved among school students [16]. Pilot study on individuals with a positive family history of CVD desired results have been depicted by improved and healthy lifestyle among respondents after delivering informative lectures [17]. A positive impact of health education intervention was achieved in a study appropriate communication methods can increase the impact of HE and prognosis of disease. Core abilities were developed in students and teachers about HL to empower their health [18]. A school based study revealed that a single, simple and least costly educational intervention can enhance preventive strategies among young adolescents and identified the best time to intervene have not yet started [19]. A randomized intervention study highlighted that counseling on screening and emphasis on lifestyle modifications had long lasting effects on physical activity [20].

Participants get sensitized to know their blood pressure in posttest despite the recent guidelines recommended that everyone above the age of 18 years should checked for HTN and after 20 years should be investigated for cholesterol levels as a preventive measure [21]. Pakistan Demographic Health Survey (PDHS) reported prevalence of obesity was 11% in rural men and 19% in rural women but in urban areas it was 23 and 40% in men and women respectively [22]. Recent research work showed that more reduction in dietary salt intake lowered morbidity and mortality by CVD [23].

Findings of this study have clearly indicated that students got sensitized about various CVD indicators. Across the globe, studies prove poor HL regarding CVD among populations which was subsequently improved by health interventions [15, 16, 19]. This study was a minor step to fill the knowledge gap among students, but there is a constant need to promote health literacy in every section of community to get better health outcomes. It is recommended that the university administration and academicians should include information related to cardiac health in their curriculum for to provide health literacy to their students. Time and funding constraints were the major limitation in our study.

**Conclusions**

The undergraduate students were initially lacking the ability to recognize the symptoms of stroke and hypertension. However, upon attending the education session, their health literacy were significantly increased.

**Abbreviations**

BMI: Body Mass Index; CVD: Cardiovascular diseases; EMRO: Eastern Mediterranean Region; HL: Health Literacy; HTN: Hypertension; PDHS: Pakistan Demographic Health Survey

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**Table 3** Positive significant change after the intervention

| Sections                  | Maximum score | Pre-test | Post-test | Absolute Change | p-Value |
|---------------------------|---------------|----------|----------|-----------------|---------|
| Hypertension & its complications | 29            | 17.080   | 21.38    | 4.30            | < 0.000 |
| Symptoms of Heart attack   | 16            | 9.280    | 12.92    | 3.68            | < 0.000 |
| Symptoms of Stroke         | 08            | 4.170    | 6.35     | 2.180           | < 0.000 |
| Total Score (HL of CVD)    | 53            | 30.53    | 40.65    | 10.12           | < 0.000 |
| Preventive practices       | 22            | 13.02    | 14.09    | 1.07            | < 0.000 |
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Authors’ contributions
MN conceived the study design and developed the intervention. RK and SAK supervised the data collection and analyses. RK and SAK drafted the successive drafts of paper. AH conducted the critical review and added the intellectual content to the paper. All authors read and approved the final draft.

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Availability of data and materials
Most data generated during this study are included in this manuscript. Other data that may support the findings of this research are available from the corresponding author on request.

Ethics approval and consent to participate
Prior to obtain the data, students were briefed about the purpose of the study. Written informed consent was obtained and confidentiality was assured to participants about the information they provided. Study was ethically approved from the institutional review board (IRB) of Health Services Academy Islamabad Pakistan and administration permission was also sought from relevant authorities.

Consent for publication
Not applicable.

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

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