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Engaging students in experiential learning through a public health campaign: a pre-post survey on hypertension and diabetes mellitus

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3 **Engaging students in experiential learning through a public health campaign: a pre-post survey on**
4 **hypertension and diabetes mellitus**

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7 **ABSTRACT**

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10 **Purpose** - This study **looked** at the impact of a community-based public health campaign on hypertension and
11 diabetes mellitus awareness and prevention, **as well as student experiential learning in a campaign** conducted by
12 pharmacy students.
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15 **Design/ methodology/ approach** - A convenience sampling cross-sectional pre-post survey was done to assess
16 disease awareness and knowledge among those who attended the health campaign. The data analysis includes a total
17 of 230 participants with complete data. **After the campaign, the pharmacy students used self-assessment to**
18 **reflect their learning experience.**
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21 **Findings** - Most participants were unaware of their blood pressure and blood glucose readings, but they reported
22 improved awareness of diseases and prevention of hypertension and diabetes after the health campaign. Although
23 most participants correctly identified the common signs and symptoms of hypertension, few could associate it with
24 overweight. Most participants were unaware of the 5 g per day salt intake limit for controlling hypertension before
25 the campaign. Most participants were less aware that diabetes is associated with impaired vision, peripheral
26 neuropathy, renal and heart diseases. **Students expressed increased confidence in leadership, teamwork, and**
27 **communication abilities after the campaign, based on self-assessment.**
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30 **Research implications** - A health campaign enhances the disease knowledge of the general public. **It has been**
31 **suggested that experiential learning be encouraged in the pharmacy curriculum.**
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34 **Originality/value** - This study adds to the knowledge on the roles of community-based health campaigns **and** the
35 value of pharmacy students involvement in experiential learning.
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37 **Keywords:** public health, disease awareness, health promotion, experiential learning, pharmacy curriculum
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39 **Paper type:** Research paper
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Introduction

Hypertension and hyperglycemia, left untreated, can greatly increase the risk of serious life-threatening complications. Due to the nature of these diseases, the signs and symptoms often do not manifest until a later stage; hence, the term “silent killers”.

According to the Malaysian National Health and Morbidity Survey, the prevalence of hypertension and diabetes mellitus was 30% and 18.3%, respectively (Institute for Public Health, 2019). Some 14.1% of the patients with newly diagnosed hypertension were reported to be unaware of their hypertension, whereas 8.9% of the newly diagnosed patients with diabetes mellitus were unaware of their condition before the diagnosis. Both cardiovascular diseases and diabetes mellitus are major contributors to the total disease burden in Malaysia (Ministry of Health, 2004), highlighting the seriousness of hypertension and diabetes mellitus in the Malaysian population.

People in the community need to be aware of their health status to monitor and control their blood pressure and blood sugar levels. Various interventions could be used to disseminate health information to the general public. Face-to-face consultations, the use of mass media, and health-promotion programs are the primary modalities for disseminating public health information (Health Development Agency, 2004). A community-based health campaign promotes public health within communities, often with a time-specific scope of interest. It focuses on direct education to the community and disease prevention strategies by mobilizing the communities' citizens (Kibler *et al.*, 2018; Landy *et al.*, 2013). These education and awareness programs are frequently conducted by health professionals, and in some cases, by advocates in the community or by patients affected by the diseases.

Pharmacy is a part of the health care system contributing to patient-centred care and optimal drug therapy outcomes. The pharmacy profession has long been recognised for its roles in public health, health promotion and disease prevention (Levin *et al.*, 2018; Strand *et al.*, 2020). **Pharmacists' responsibilities have grown in recent decades such as self-care, herbal supplement management, and even COVID-19 vaccination administration. (Bell *et al.*, 2016; Petrelli *et al.*, 2019; Yeong and Choong, 2017). Pharmacists' expanding roles in public health necessitate changes in pharmacy education and training.**

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3 Kolb et al described the Experiential Learning Theory as learning from experience, often
4 through human activities (Kolb and Kolb, 2017a; Morris, 2020). The pharmacy curriculum consists of
5 the core of didactic courses, laboratory experimental classes, clerkships and clinical rotations in
6 hospitals with some innovations into teaching methods such as problem-based learning and problem-
7 solving learning. Clerkships and clinical rotations resemble the Experiential Learning Theory with
8 students learning in real-life clinical situations. Experiential learning **in pharmacy** is a cycle of
9 learning style with hands-on learning from real-life experience **in a professional setting** with a
10 component of students reflecting on their learning (Owen *et al.*, 2008). **Experiential learning is**
11 **included into the pharmacy curriculum as a key ability for developing continued learning early**
12 **in the professional years (Fjortoft, 2006; Wheeler *et al.*, 2017). Self-directed learning evaluation,**
13 **or self-assessment, is an important method for gauging experiential learning, with review and**
14 **reflection identified as one of Kolb's four components. (Kolb and Kolb, 2017).**

25 26 **Aims and objectives**

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29 **The aim of this study was to evaluate how a community-based public health campaign improved**
30 **illness awareness and prevention, as well as how much experiential learning aided pharmacy**
31 **students' learning.** There are two specific objectives, which include:

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33 (a) investigating whether community-based health campaigns contribute to the increased public
34 awareness of disease knowledge and prevention of hypertension and type 2 diabetes mellitus.

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36 (b) **employing a self-assessment questionnaire to assess pharmacy students' experience learning**
37 **in planning a community-based health campaign.**

38 39 40 **Methods**

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42 This study looks at the outcomes of a community-based campaign and reports the experiential learning
43 of a group of pharmacy students.

44 45 ***Pre-post survey of participants***

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47 The study design of this research engages the use of cross-sectional, pre-post surveys in the form of
48 self-administered questionnaires at a community-based health campaign site to understand the
49 outcomes of the health promotion campaign. The survey instrument was developed with reference to
50 other cross-sectional studies on disease awareness and prevention (Fryar *et al.*, 2017; Ministry of
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3 Health, 2004; Ministry of Health Malaysia, 2018; National Institute of Health, 2017). Questionnaires
4 were developed with the 3 main languages used among the communities' various ethnic groups,
5 including English, Malay, and Chinese. Both content and translation validation were conducted (Cota
6 *et al.*, 2017) (Zamanzadeh *et al.*, 2015). Translation validation was performed for the questionnaires in
7 3 different languages. Forward and backward translations were performed; the translated version was
8 compared with the original version of the questionnaire based on conceptual and cultural equivalence.
9 Five academic staff proficient in their mother tongue (in each of the languages) and English provided
10 consultation in the content and translation validation. The questionnaires were amended based on them
11 before the pilot study.
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20 A pilot study was conducted with 5 participants for each language version (English, Bahasa
21 Malaysia, and Mandarin) of the questionnaire. This pilot study aimed to ensure proper interpretation
22 between the 3 language versions and to reduce oversights and bias in the questionnaires. Data from the
23 pilot study were not included in the final data analysis.
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28 Convenience sampling was used with participants recruited from the site of the community-
29 based public health campaign. Participants were recruited according to the following inclusion and
30 exclusion criteria. Inclusion criteria included participants aged 18 years and older, with the
31 understanding of 1 of the following 3 languages: English, Malay, or Chinese. Exclusion criteria
32 included those not registered in the community-based health campaign and those who did not provide
33 consent to participate. The questionnaires were administered after obtaining written consent from the
34 participants.
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41 Upon completing the pre-campaign questionnaire, participants began the community-based
42 health campaign activities, including health screenings and attending a poster exhibition about diseases
43 and prevention. Poster exhibitions with general information about hypertension and type 2 diabetes
44 mellitus were displayed at the campaign site. Explanations about the general information on the posters
45 were provided by pharmacists and trained pharmacy students. Random blood pressure and blood
46 glucose measurements were taken at the campaign site. A post-campaign questionnaire was completed
47 before participants exited the health campaign site. Registered pharmacists were at the site to answer
48 enquiries from the public regarding medicines and diseases. They explained the random screening
49 readings to the participants and advised them to seek further medical check-ups if needed. The
50 pharmacist also explained other medicine-related matters.
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The sample size for this cross-sectional survey was calculated using the formula below (Charan and Biswas, 2013):

$$n = \frac{(Z_{1-\alpha/2})^2 P (1-P)}{d^2}$$

n: sample size

($Z_{1-\alpha/2}$): 1.96 with 95% confidence interval, when the p-value is less than 0.05

P: expected prevalence or proportion in population-based on previous studies, which is 0.14

d: absolute error or precision

A minimum of 185 participants was needed for this study.

Data were coded, entered, and subjected to statistical analysis using Statistical Package for the Social Sciences (SPSS) software version 20. Descriptive data were expressed as frequency and percentage. Wilcoxon signed-rank test was used to compare variables between pre-post data in the survey.

Experiential learning in organising a health campaign

This community-based health campaign was organised by a group of pharmacy students with the support of registered pharmacists. **For organising the health campaign, students receive extra-curricular credit. Credits obtained count toward the number of credits necessary for graduation.**

Prior to the health campaign, students were expected to submit a proposal that included explanations of the campaign's themes and focus, targeted communities, health promotion strategies, activity budgets, and fundraising plans. The plan required approval from both the faculty and the university's student affairs division. The health campaign included disease awareness and prevention activities such as health information exhibitions, health screening tests, health discussions and forums, and drug counselling sessions. **Students were asked to produce a post-event report that included a self-assessment to reflect on their experiential learning experience.**

Results

Outcomes of a community-based health campaign

A total of 220 participants who met the inclusion criteria and consented to participate were recruited. Table 1 summarizes the demographics of the participants in this pre-post survey. There were more women than men in this study. The majority of the participants were younger than 50 years of age and were married.

The majority of the participants were not aware of their blood pressure and blood glucose readings before attending the health campaign event (refer to Table 1). Blood pressure measured at the campaign site revealed that 29.3% of the participants had high blood pressure and 5.5% of the participants had elevated blood glucose.

[Place Table 1 here if possible]

Table 2 summarises the knowledge level of the participants in hypertension. The participants were found to be more knowledgeable about hypertension after the campaign compared with before, in relation to the questions asked. Fewer participants knew about the association between potassium intake and blood pressure pre-campaign compared with post-campaign. Although many were aware that high salt intake results in high blood pressure, not many knew about salt's daily maximum limit. Participants were also less aware that ageing and being overweight contributes to the risk of hypertension. Many of the participants were aware that hypertension could lead to heart failure and stroke; however, fewer of them associated kidney failure and impaired vision with hypertension.

Table 3 annotates the knowledge level of participants on diabetes. Participants showed significantly improved knowledge that thirst, hunger, and weight-loss were signs of type 2 diabetes mellitus after the campaign. Although participants showed sufficient knowledge about healthy lifestyles to prevent diabetes mellitus, many did not associate ageing and overweight as risk factors. Most of the participants knew that diabetic foot is a complication of diabetes; however, the majority did not associate peripheral neuropathy with diabetes.

[Place Table 2 and Table 3 here if possible]

Experiential learning reflections of pharmacy students

This community-based health campaign was organised by a group of 40 pharmacy students from year 1 and year 2 under the supervision of academic staff and qualified pharmacists. The creation of an organising committee, consisting of a chairperson, a treasurer, and a secretary, was mentioned in the post-event report. Structured divisions were developed to carry out the various health promotion activities, such as producing display materials, organising health screening activities, acquiring sponsorships, engaging with the public, and publicizing the campaign among the community. Additionally, pharmacy students worked with community pharmacists, doctors, health organisations, and community associations in the area.

The students completed a self-assessment to critically reflect on the learning experience after the health campaign.

Their responses were as follow:

- 69 per cent "strongly agree" and 11 per cent "agree" that their participation in the health campaign helped them to better understand the knowledge learned in their didactic courses.
- 92 per cent reported that they used what they learnt to organise the health campaign.

When comparing the learning experience of the health campaign to formal didactic courses,

- 94 per cent indicated that they are better prepared for leadership and teamwork skills;
- 86 per cent believed that they are better prepared for project management and budgeting skills;
- 83 per cent indicated that they were better in presentation and interpersonal skills;
- 69 per cent believed that they better understand cultures and personal behaviour in health;
- 64 per cent indicated that they develop better critical and problem-solving skills.

Discussion

In this study, **more women attended the campaign**. The trend to have more women could be due to the greater health consciousness of women regarding self-care (Duplaga, 2019). Duplaga M et al. similarly reported more women in their study, and that men were more sceptical about the effectiveness of health-related campaigns. **The screening tests of abnormal blood pressure readings among the participants in this study aligned** to the prevalence of hypertension reported in the national level reported in NHMS 2019, whereas the number of abnormal high blood glucose levels was much lower.

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3 The lower number of abnormal blood glucose readings in our study could be due to the random blood
4 glucose taken at the campaign and not the fasting blood glucose tests employed for the **reporting of**
5 **confirmed diabetes diagnosis at the national level. Nonetheless, these findings indicate further**
6 **screening and diagnosis are needed at the community for chronic diseases such as diabetes and**
7 **hypertension.**

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13 Naing et al. had reported that those younger than 40 years old were more willing to attend
14 health screening tests (Naing *et al.*, 2014). The results of our study concur with this report, with the
15 majority of our participants aged younger than 50 years. Factors such as better access to the internet,
16 faster access to health information, and better health education and awareness could have resulted in
17 greater participation of the younger population in the health campaign. **The fact that free health**
18 **screening tests were available at the campaign could have been another aspect that drew younger**
19 **people in. Those who have been diagnosed with the two disorders and see their doctors on a**
20 **regular basis, usually older age groups, are less likely to attend the campaign as they believe their**
21 **problems have been adequately addressed (Naing *et al.*, 2014)**

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31 One of the concerning findings in this study was the low self-awareness of own health status
32 of the participants. This finding concurred with similar studies, which have indicated a low level of
33 health status self-awareness among Malaysians (Abdul-Razak *et al.*, 2016a) (Minhat and Hamedon,
34 2014) (Yen *et al.*, 2017). There is a need to review the success of mass communication in changing the
35 health behaviours of individuals in the communities.

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Several studies have reported that a lack of community understanding of the importance of
health screenings was the most common barrier to the early detection of hypertension and diabetes
mellitus (Kibler *et al.*, 2018; Shima *et al.*, 2014). **In addition, poorer people and indigenous ethnic**
groups were said to be less aware of their health state and are less likely to be treated for their
ailments (Abdul-Razak *et al.*, 2016). Community-based health campaign targeting these
populations could identify local health matters, identify high-risk individuals and share public health
messages across the entire community **to further support population health.**

Overall, the participants were sufficiently aware of the signs and symptoms and healthy
lifestyles for hypertension and diabetes. This may be due to the success of mass communication of
health promotion messages. However, participants in this study did not recognise kidney failure and

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3 impaired vision as complications of hypertension. This finding is consistent with other studies in which
4 the respondents were not able to identify the complications of hypertension (Bilal *et al.*, 2015) (Sathish
5 Kumar *et al.*, 2015). Although the participants in our study recognized kidney disease and diabetic foot
6 as complications of diabetes mellitus, they were not able to associate peripheral neuropathy with
7 diabetes mellitus. Despite being aware of physical inactivity as a risk factor, they did not associate
8 overweight with diabetes mellitus. In addition, a study in Kuala Lumpur showed that 60% of the
9 respondents had a misconception that diabetes mellitus is curable (Mahmud, 2015). Similar findings
10 have been shown in other studies (Qamar *et al.*, 2017) (Deepa *et al.*, 2014). Health education materials
11 might require the use of appropriate examples relevant to the daily practice of a multi-ethnic group.
12 Appropriately explained medical terms and information are also important for effective health
13 promotion. Our campaign was able to identify the lack of knowledge or misconceptions of the local
14 community about certain aspects of disease knowledge.

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Our findings showed that this community-based health campaign could identify participants with abnormal blood pressure and blood glucose readings. Advice for further action by the participants was provided by health professionals. Landy *et al.* had reported the effectiveness of their campaign in identifying participants with abnormal blood cholesterol levels (Landy *et al.*, 2013). Altman *et al.* had found that participants in a community-based campaign showed improved knowledge of the symptoms and risk factors of cardiovascular disease (Altman *et al.*, 2014). Community-based health campaigns with knowledgeable health professionals **could further educate the public and support healthier living styles.**

The pharmacy students demonstrated their learning process, which began with prior learning experiences in didactic courses, progressed to concepts with a project proposal, then to new experiences with learning in a real - world setting, and finally to self-assessment and reflections on their learning; These are the components of Kolb's Experiential Learning Theory – concrete experience abilities, reflective observation abilities, abstract conceptualisation abilities, and active experimentation abilities (Kolb and Kolb, 2017). Self-assessment in this study, on the other hand, was structured and connected to the needs of the university's extra-curriculum credit units, in contrast to Kolb's reflective observation abilities, which did not emphasise “critical” reflection. (Morris, 2020). Students did, however, gain additional skills necessary for their professional careers, which will help them continue to learn and practise in a field with ever-

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3 **expanding positions in public health. (Sinclair *et al.*, 2020; Singh *et al.*, 2020; Smith and Olin,**
4 **2010).**

7 **Conclusion**

10 This study shows that a community-based health campaign **supports disease awareness and**
11 **prevention at the community level to some extent.** After the campaign, the general population
12 reported enhanced disease knowledge and awareness, **albeit the effect's long-term viability was**
13 **unknown.** Future **research** should include evaluation of the understanding of the public in the
14 intended mass public health messages of the health authorities.

20 Pharmacy students demonstrated the application of public health principles through the
21 organisation of the public health campaign. This study further supports the incorporation of public
22 health concepts in a pharmacy curriculum through experiential learning. Future studies could measure
23 the learning outcomes of experiential learning and compare them to the traditional forms of learning in
24 a pharmacy curriculum.

30 Our study had some limitations. As with other cross-sectional studies, we investigated a
31 particular population; thus, the results may not be generalisable to other sites. **Other factors could**
32 **have influenced participants' replies in the pre-post survey, as they are exposed to different**
33 **health experiences and exposure from other sources. Because of the short time interval between**
34 **the pre- and post- surveys in this study, it is not possible to say whether the disease knowledge**
35 **gained will be maintained after the campaign. Future studies could include a longer follow-up**
36 **period to investigate the effects of community-based health campaigns in public health.**

44 **On the other hand, the added "feel good" impacts of project completion could have**
45 **affected the pharmacy students' high post-event self-assessment scores. Future studies could**
46 **include external or faculty assessment in assessing the impact of experiential learning in**
47 **pharmacy curriculum.**

53 **Acknowledgement**

54 Appreciation to the organising committee of the 18th UCSI Public Health Campaign for
55 accommodating the study sites.

59 **Ethical approval**

All procedures in this study were following the ethical standards of the Malaysian Ministry of Health Medical Research Ethics Committee, code number NMRR-19-1319-48612. Written informed consent was obtained from participants before the survey.

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Table I. Characteristics of participants

<i>Participant characteristics</i>	n (%) (N = 220)
Gender	
Male	90 (40.9)
Female	130 (59.1)
Age range (year-old)	
18-30	68 (30.9)
31-50	83 (37.7)
51-70	57 (25.9)
>70	12 (5.5)
Ethnicity	
Chinese	132 (60.0)
Malay	84 (38.2)
Indians	2 (0.9)
Others	2 (0.9)
Education level	
Primary education	3 (1.4)
Secondary or high school education	109 (49.5)
College or university	107 (48.6)
No formal education	1 (0.5)
Household income (monthly)	
<RM1000	37 (16.8)
RM1000 – RM3000	95 (43.2)
RM3001 – RM5000	72 (32.7)
>RM5000	16 (7.3)
Marital Status	
Single	78 (35.5)
Married	142 (64.5)
Random blood pressure (SBP/DBP) (mmHg)	
< 120/ 80	78 (35.5)
120 - 129 either or 80 - 84	45 (20.5)
130 - 139 either or 85 to 89	32 (14.5)
140 - 159 either or 90 to 99	48 (21.8)
160 - 179 either or 100 to 109	16 (7.2)
≥ 180/ 110	1 (0.5)
Random blood glucose (mmol/L)	
< 7.8	176 (88)

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7.8 - 11	13 (6.5)
≥ 11.1	11 (5.5)
*Not measured	20 (NA)

Self-awareness of own blood pressure readings

Yes	43 (19.55)
No	172 (78.18)
Not sure	5 (2.27)

Self-awareness of own blood glucose readings

Yes	16 (7.27)
No	194 (88.18)
Not sure	10 (4.55)

SBP: systolic blood pressure; DBP: diastolic blood pressure

*measurement was not taken as no fasting 2 hours before test

NA: not applicable (data were not included in statistics)

Table II. Knowledge of participants on hypertension before and after a community-based health campaign

	Pre-Campaign				Mean	Post-Campaign				Mean	Wilcoxon-signed rank	
	Yes (n,%)	No (n,%)	I do not know (n,%)	Not answered* (n,%)		Yes (n,%)	No (n,%)	I do not know (n,%)	Not answered* (n,%)		z	r
Q3	What are the signs and symptoms of high blood pressure?											
a. Headache	153, 69.5	40, 18.2	22, 10.0	5, 2.3	1.39	190, 86.4	20, 9.1	8, 3.6	2, 0.9	1.17	-5.176 p < 0.001	-0.355
b. Dizziness	173, 78.6	21, 9.5	22, 10.0	4, 1.8	1.30	197, 89.5	15, 6.8	8, 3.6	0, 0.0	1.14	-4.051 p < 0.001	-0.276
c. Fatigue	132, 60.0	55, 25.0	29, 13.2	4, 1.8	1.54	176, 80.0	32, 14.5	11, 5.0	1, 0.5	1.25	-5.793 p < 0.001	-0.395
Q4	Which of the following lifestyle can lower blood pressure?											
a. High salt intake	6, 2.7	183, 83.2	28, 12.7	3, 1.4	2.10	2, 0.9	213, 96.8	2, 0.9	3, 1.4	2.00	-4.017 p < 0.001	-0.274
b. Alcohol consumption	5, 2.3	175, 79.5	35, 15.9	5, 2.3	2.14	3, 1.4	191, 86.8	23, 10.5	3, 1.4	2.09	-2.84 p < 0.05	-0.195
c. Regular physical activity	212, 96.4	5, 2.3	2, 0.9	1, 0.5	1.04	215, 97.7	4, 1.8	0, 0.0	1, 0.5	1.02	-1.518 p = 0.129	-0.103
d. Healthy eating	216, 98.2	1, 0.5	1, 0.5	2, 1.0	1.01	217, 98.6	2, 0.9	0, 0.0	1, 0.5	1.01	-0.447 p = 0.655	-0.030
e. Smoking	9, 4.1	204, 92.7	4, 1.8	3, 1.4	1.98	4, 1.8	213, 96.8	0, 0.0	3, 1.4	1.98	-0.302 p = 0.763	-0.021
f. Stress	9, 4.1	196, 89.1	12, 5.5	3, 1.4	2.01	5, 2.3	209, 95.0	3, 1.4	3, 1.4	1.99	-1.213 p = 0.225	-0.083
g. Increased potassium intake	37, 16.8	80, 36.4	96, 43.6	7, 3.2	2.28	77, 35.0	71, 32.3	68, 30.9	4, 1.8	1.96	-5.798 p < 0.001	-0.4
Q5	What are the risk factors of high blood pressure?											
a. Family history of hypertension	183, 83.2	24, 10.9	7, 3.2	6, 2.7	1.18	205, 93.2	8, 3.6	4, 1.8	3, 1.4	1.07	-2.997 p = 0.003	-0.206
b. Increased age	169, 76.8	40, 18.2	4, 1.8	7, 3.2	1.23	198, 90.0	18, 8.2	2, 0.9	2, 1.0	1.10	-4.761 p < 0.001	-0.328

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4	c. Overweight	174, 79.1	35, 15.9	5, 2.3	6, 2.7	1.21	205, 93.2	11, 5.0	2, 0.9	2, 1.0	1.07	-5.231 p < 0.001	-0.359
5													
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7	d. High salt intake	189, 85.9	3, 1.4	22, 10.0	6, 2.7	1.22	212, 96.4	1, 0.5	5, 2.3	2, 1.0	1.05	-4.300 p < 0.001	-0.295
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10	e. Salt intake of more than one teaspoon per day	148, 67.3	10, 4.5	54, 24.5	8, 3.6	1.56	198, 90.0	5, 2.3	15, 6.8	2, 1.0	1.16	-6.227 p < 0.001	-0.429
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13	Q6 High blood pressure can cause which of the following conditions?												
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15	a. Heart failure	201, 91.4	6, 2.7	6, 2.7	7, 3.2	1.08	213, 96.8	2, 0.9	1, 0.5	4, 1.9	1.02	-2.739 p = 0.006	-0.189
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18	b. Stroke	203, 92.3	6, 2.7	4, 1.8	7, 3.2	1.07	216, 98.2	2, 0.9	1, 0.5	1, 0.5	1.02	-2.428 p = 0.015	-0.166
19													
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21	c. Kidney disease	136, 61.8	39, 17.7	38, 17.3	7, 3.2	1.54	196, 89.1	15, 6.8	6, 2.7	3, 1.4	1.12	-6.903 p < 0.001	-0.475
22													
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24	d. Impaired vision	125, 56.8	38, 17.3	49, 22.3	8, 3.6	1.64	190, 86.4	17, 7.7	11, 5.0	2, 0.9	1.18	-7.219 p < 0.001	-0.497
25													
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27	e. Cancer	52, 23.6	122, 55.5	37, 16.8	9, 4.1	1.93	45, 20.5	160, 72.7	13, 5.9	2, 0.9	1.85	-2.256 p = 0.024	-0.156
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31	f. Diabetes	124, 56.4	60, 27.3	27, 12.3	9, 4.1	1.54	85, 38.6	128, 58.2	5, 2.3	2, 0.9	1.63	-1.980 p = 0.048	-0.137
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*question was not answered by participants

Table III. Knowledge of participants on diabetes before and after attending a health campaign

	Pre-Campaign					Post-Campaign					Wilcoxon-signed rank	
	Yes (n,%)	No (n,%)	I do not know (n,%)	Not answered* (n,%)	Mean	Yes (n,%)	No (n,%)	I do not know (n,%)	Not answered* (n,%)	Mean	z	r
Q7	What are the signs and symptoms of high blood glucose?											
a. Increased thirst	102, 46.4	35, 15.9	62, 28.2	21, 9.5	1.80	173, 78.6	12, 5.5	31, 14.1	4, 1.8	1.34	-7.258 p < 0.001	-0.517
b. Increased hunger	78, 35.5	59, 26.8	63, 28.6	20, 9.1	1.93	163, 74.1	20, 9.1	34, 15.5	3, 1.4	1.41	-8.022 p < 0.001	-0.569
c. Frequent urination	151, 68.6	17, 7.7	32, 14.5	20, 9.1	1.41	193, 87.7	8, 3.6	16, 7.3	3, 1.4	1.18	-4.642 p < 0.001	-0.329
d. Frequent night time urination	155, 70.5	13, 5.9	31, 14.1	21, 9.5	1.38	195, 88.6	5, 2.3	16, 7.3	4, 1.8	1.17	-4.512 p < 0.001	-0.321
e. Fatigue	130, 59.1	44, 20.0	26, 11.8	20, 9.1	1.48	188, 85.5	20, 9.1	10, 4.5	2, 0.9	1.18	-5.928 p < 0.001	-0.419
f. Weight loss	82, 37.3	82, 37.3	36, 16.4	20, 9.1	1.77	158, 71.8	43, 19.5	15, 6.8	4, 1.8	1.34	-7.817 p < 0.001	-0.556
g. Altered vision	139, 63.2	26, 11.8	35, 15.9	20, 9.1	1.48	197, 89.5	8, 3.6	13, 5.9	2, 0.9	1.16	-5.684 p < 0.001	-0.402
Q8	Which of the following lifestyle can lower blood glucose?											
a. Smoking	198, 90.0	2, 0.9	0, 0.0	20, 9.1	1.99	216, 98.2	1, 0.5	0, 0.0	3, 1.4	2.00	-1.414 p = 0.157	-0.1
b. Alcohol consumption	3, 1.4	196, 89.1	1, 0.5	20, 9.1	1.99	1, 0.5	216, 98.2	0, 0.0	3, 1.4	2.00	-1.000 p = 0.317	-0.071
c. Healthy diet	197, 89.5	3, 1.4	1, 0.5	19, 8.6	1.03	217, 98.6	1, 0.5	0, 0.0	2, 0.9	1.01	-1.633 p = 0.102	-0.115
d. Regular physical exercise	199, 90.5	2, 0.9	0, 0.0	19, 8.6	1.01	217, 98.6	1, 0.5	0, 0.0	2, 0.9	1.01	-1.000 p = 0.317	0.071
Q9	What are the risk factors of high blood glucose?											
a. Family history of hypertension	138, 62.7	51, 23.2	9, 4.1	22, 10.0	1.35	133, 60.5	77, 35.0	7, 3.2	3, 1.4	1.42	-1.303 p = 0.193	-0.093
b. Increased age	147, 66.8	49, 22.3	3, 1.4	21, 9.5	1.28	197, 89.5	17, 7.7	3, 1.4	3, 1.4	1.11	-5.324 p < 0.001	-0.378
c. Overweight	167, 75.9	27, 12.3	3, 1.4	23, 10.5	1.17	205, 93.2	12, 5.5	0, 0.0	3, 1.4	1.06	-4.669 p < 0.001	-0.334

