

Effects of the Facilitative-Peer-Mentoring in undergraduate clinical teaching: preliminary results.
(*Kesan Pembimbing-Rakan-Sebaya-Fasilitatif dalam pengajaran klinikal prasiswazah: hasil preliminari*)

MIZHANIM MOHAMAD SHAHIMIN*, SHAZ' AIN RAZAK & NORLAILI ARIF

ABSTRACT

We presented preliminary results on the effects of the Facilitative-Peer-Mentoring (FPM) in Optometry's undergraduate clinical teaching via cognitive and psychomotor domains and evaluating acceptance among students. All Year Three Optometry undergraduates were randomly divided into two groups. Each group served as a control group when they are not involved in the FPM activity. The FPM activity was performed by the Year Four students (peer leaders). The peer learner groups' cognitive and psychomotor improvements and acceptance towards the FPM were evaluated using the Objective Structured Clinical Examination (OSCE), the Objective Structured Practical Examination (OSPE), and the Clinical Teaching Preference Questionnaire (CTPQ). The cognitive domain tested using the OSCE showed a significant difference between the FPM and control groups in both sessions ($p < 0.05$). However, the psychomotor domain (OSPE) showed a significant difference in the first session (FPM group = 77.71 ± 7.50 marks; Control group = 63.96 ± 13.38 marks; $p = 0.005$), but not in the second session (FPM group = 60.83 ± 15.35 marks; Control group = 64.17 ± 13.46 marks; $p = 0.653$). Descriptive analysis showed a higher response on the 'agree' scale of the CTPQ items 1,4,5,8 and 9. Although the cognitive domain through the OSCE showed no improvement in either session for the groups, the psychomotor domain showed skills proficiency in one of the FPM sessions. The FPM program implemented was widely accepted among the peer learners and was reflected in their positive CTPQ responses. The potential of embedding the FPM in clinical teaching in the core curriculum should be considered to support learning through peers.

Key Words: Facilitative-Peer-Mentoring; Clinical teaching; Cognitive; Psychomotor; Optometry.

ABSTRAK

Kajian ini adalah hasil awal kesan Pembimbing-Rakan-Sebaya-Fasilitatif (PRSF) dalam pengajaran klinikal prasiswazah Optometri melalui domain kognitif dan psikomotor, dan penilaian penerimaan dalam kalangan pelajar. Semua pelajar Tahun Tiga Optometri dibahagikan secara rawak kepada dua kumpulan. Setiap kumpulan berfungsi sebagai kumpulan kawalan apabila mereka tidak terlibat dalam aktiviti PRSF. Aktiviti PRSF dilakukan oleh pelajar Tahun Empat (rakan sebaya). Peningkatan dan penerimaan kognitif dan psikomotor kumpulan rakan sebaya terhadap PRSF dinilai menggunakan Pemeriksaan Klinikal Objektif Berstruktur (OSCE), Pemeriksaan Praktikal Berstruktur Objektif (OSPE), dan Soal Selidik Clinical Teaching Preference Questionnaire (CTPQ). Domain kognitif yang diuji menggunakan OSCE menunjukkan perbezaan yang signifikan antara PRSF dan kumpulan kawalan dalam kedua-dua sesi ($p < 0.05$). Walau bagaimanapun, domain psikomotor (OSPE) menunjukkan perbezaan yang signifikan pada sesi pertama (kumpulan PRSF = 77.71 ± 7.50 markah; Kumpulan kawalan = 63.96 ± 13.38 markah; $p = 0.005$), tetapi tidak signifikan pada sesi kedua (kumpulan PRSF = 60.83 ± 15.35 markah; Kumpulan kawalan = 64.17 ± 13.46 markah; $p = 0.653$). Analisis deskriptif menunjukkan respon yang lebih tinggi pada skala 'setuju' item CTPQ 1,4,5,8 dan 9. Walaupun domain kognitif melalui OSCE tidak menunjukkan peningkatan dalam kedua-dua sesi untuk kumpulan tersebut, domain psikomotor menunjukkan kecekapan kemahiran dalam salah satu sesi PRSF. Program PRSF yang dilaksanakan diterima secara meluas oleh pelajar, sebagaimana respons positif CTPQ yang direkodkan. Potensi amalan PRSF dalam pengajaran klinikal kurikulum teras harus dipertimbangkan untuk menyokong pembelajaran melalui rakan sebaya.

Kata Kunci: Pembimbing-Rakan-Sebaya-Fasilitatif; Pengajaran klinikal; Kognitif; Psikomotor; Optometri.

INTRODUCTION

The Facilitative-Peer-Mentoring (FPM) or peer-assisted learning, is one of many student-centered pedagogic tools that have gained tremendous interest in health education. It has been widely used in various higher education courses, including in medical (McCoy et al. 2018; Yu et al. 2011), paramedic (Williams et al. 2014), nursing (Stone et al. 2013), physiotherapy (Sevenhuysen et al. 2015), athletic training (Henning et al. 2006) and other courses in the allied health field (Santee & Garavalia 2006). The FPM's main concept is essentially to engage teaching delivery and learning activities between peers or students, improving the development of students' knowledge, understanding, and practical skills through instruction or experience (Henning et al. 2008). Students who received assistance in learning were referred to as the 'peer learners', and students who provided assistance in learning were referred to as the 'peer leaders'.

Previous research has shown the FPM's effectiveness both quantitatively by assessing the lesson outcomes and qualitatively via the acceptance of this method. The FPM was proven beneficial to both peer learner and peer leader by improving academic values (Stone et al. 2013; Santee & Garavalia 2006; Secomb 2008), providing a comfortable learning environment (Glynn et al. 2006; Mckenna & French 2011), increasing student's confidence level (Williams et al. 2014; Secomb 2008; Field et al. 2007) and providing social support in teaching and learning activities (Hammond et al. 2010). Nevertheless, several studies reported the limitations in generalizing these findings due to flaws in the operational and execution of the FPM activities (Santee & Garavalia 2006) and improper study design and various methods of reporting (Stone et al. 2013).

Despite this, the FPM can be used as an alternative teaching method in mastering clinical skills (Marton et al. 2015). Optometry program is one of the courses that require critical clinical skills to examine the eye, thus, the students are expected to achieve clinical competency in their pre-clinical year before handling and managing their own patients under supervision in Year Four (clinical year). Often time to master the skills is very limited, and the learning curve is steep to achieve the objective. Therefore, implementing the FPM into the optometry curriculum may pave a new understanding of this method's effectiveness and suitability for teaching and learning in the optometric field. Hence, this study investigated the FPM's effectiveness in one of the core skills that the students must master, which is the slit lamp biomicroscopy examination (SLBE), through the improvement in cognitive and psychomotor domains as well as acceptance among participated students.

RESEARCH METHODOLOGY

Participants

This study was prospective experimental research involving all Year Three Optometry undergraduate students (n=24) in Universiti Kebangsaan Malaysia as the 'peer learner' group through purposive sampling. This particular group of students was selected due to the SLBE clinical teaching course availability in the third year (pre-clinical year). The Year Three students will receive formal training on using the slit lamp instrument during their pre-clinical year. All Year Four Optometry senior undergraduate students (n=12) acted as 'peer leaders' as they were more experienced in SLBE, being in their clinical year. This study obtained ethical clearance from the Research Ethics Committee of Universiti Kebangsaan Malaysia (UKM 1.5.3.5/244/NN-062-2015). All participants were briefed on the research and written consent obtained from each participant before the commencement of this study.

Delivery of the clinical teaching subject: The slit lamp biomicroscopy

All Year Three students attended a series of lectures and practical sessions on the slit lamp biomicroscopy module. There were two-hour lectures on two consecutive weeks (total of four hours) given by a senior lecturer in the classroom. A four-hour practical session involving demonstration and hands-on practice of SLBE was also performed on the same week as the lecturer's lecture sessions with two clinical instructors' help. On top of the clinical subject's regular delivery, the Year Three students were exposed to the FPM as detailed in the following framework.

The Facilitative-Peer-Mentoring implementation framework

Teaching and learning activities using the FPM spun through eight weeks in the semester. All Year Three students were randomly divided into two groups, namely Group A (n=12) and Group B (n=12). Group A students received the FPM from the Year Four students (n=12) first, while Group B was not exposed to the FPM and acted as a control group. After week four, the Year Four students (henceforth is referred to as peer leaders) assisted Group B for another four weeks while Group A served as control. Such rotation was done to ensure all students received the FPM (Figure 1).

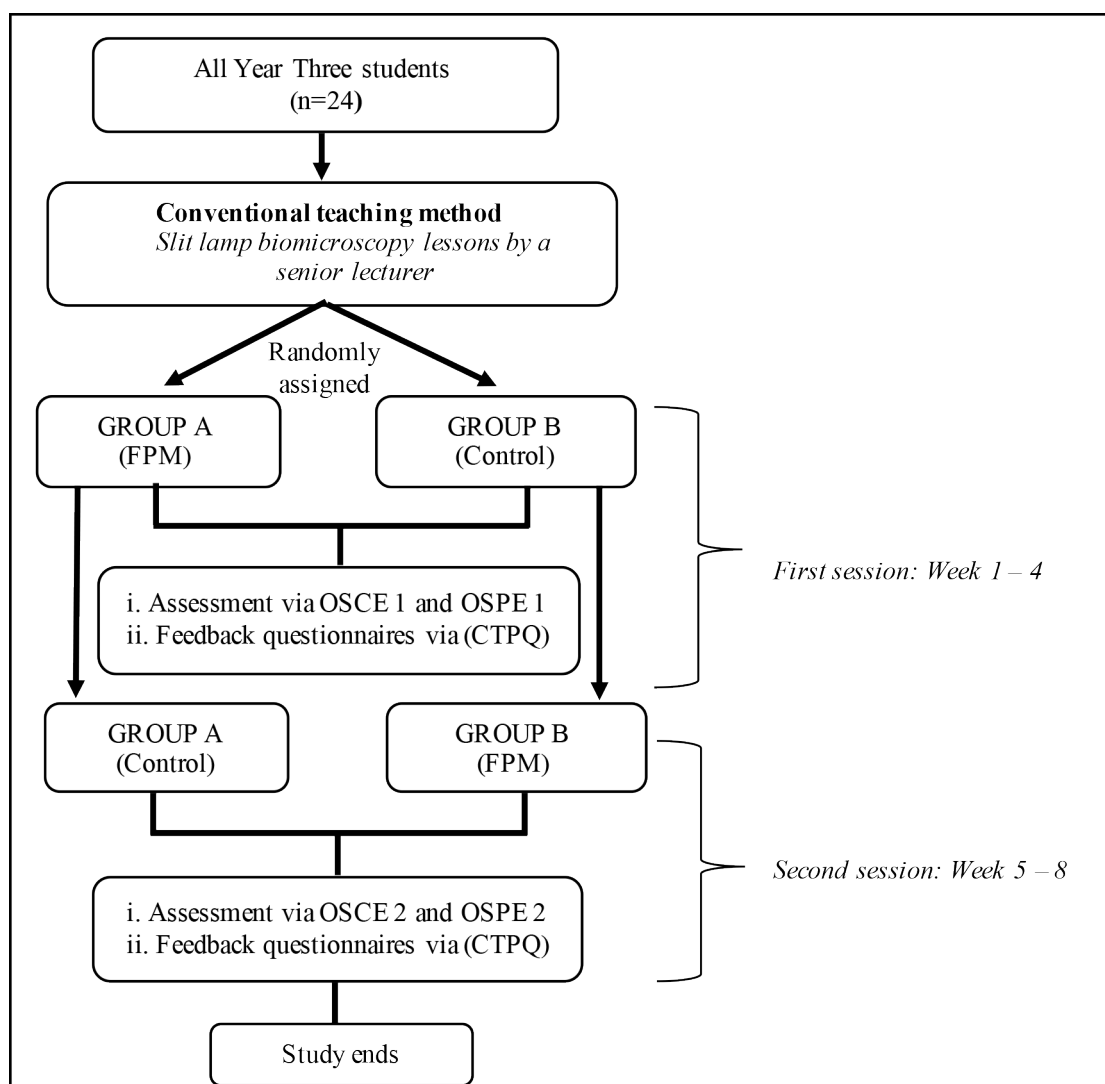


FIGURE 1. The Facilitative-Peer-Mentoring implementation framework.

Each student who received the FPM (henceforth is referred to as peer learner), was randomly assigned to a peer leader and received training in a one-to-one peer learner-peer leader ratio. The peer learners were assisted by peer leaders in learning and operating the slit lamp biomicroscope and examining the eye in SLBE. The FPM was conducted for a minimum of an hour for each session. Students were given the freedom to arrange their sessions depending on their free time and leisure during the ongoing semester. Students in the control group were encouraged to do their own revision and practice during active sessions.

All Year Three students were assessed using an OSCE to demonstrate the cognitive domain by answering the written examination's theoretical questions. The OSPE was also performed to demonstrate the psychomotor domain in handling the instrument

and performing SLBE. Both OSCE and the OSPE were conducted twice during this study, each after the first and second FPM sessions, respectively. Assessments made on the first session were denoted as OSCE 1 and OSPE 1, while OSCE 2 and OSPE 2 referred to the assessments made in the second session. Examiners for the assessments were one senior lecturer and one senior clinician blinded to the students' FPM grouping.

Feedback questionnaires

The Clinical Teaching Preference Questionnaire (CTPQ) was used to evaluate peer learners' attitudes and perceptions towards the FPM sessions integrated into the slit lamp biomicroscopy lesson. The questionnaire was previously validated by McKenna and French (2011) in a nursing cohort, after being adapted from Iwasiw

and Goldernberg (1993). Each questionnaire consists of 10 items measuring in a 5-point Likert scale with 0 for 'strongly disagree' and 5 for 'strongly agree'. For the study's purpose, we have translated and validated the questionnaire to suit the clinical teaching in Optometry (Yusoff et al. 2018). Two terminologies in the CTPQ were changed. This involves changing 'nursing' to 'optometrists' and 'optometric' in three item stems. The questionnaire was given to peer learners following the end of their allocated sessions.

Data Analysis

The IBM SPSS Statistics for Windows, Version 26.0 (Armonk, NY: IBM Corp) was used for statistical analysis. A p -value < 0.05 was considered statistically significant. Normality distribution was tested for all data using the Shapiro-Wilk test and deemed to be normally distributed ($p > 0.05$). An independent t-test was used to compare the FPM and control groups' cognitive and psychomotor improvements. A paired t-test was used in determining the difference within the group in the two sessions. In determining the FPM intervention's acceptance among students, descriptive analysis was used to illustrate the participant's perception through items evaluated in the CTPQ. Each item was tested using an independent t-test to compare the difference in responses between groups.

RESULTS AND DISCUSSION

Demographic analysis

There were 24 students in the first session (12 peer learners of Group A, 12 controls of Group B), and 23 students in the second session (11 peer learners of Group B, 12 controls of Group A). One peer learner failed to attend any FPM within allocated time in

the second session and thus was excluded from this study. Peer learners' mean age was 21.54 years old (two males and 22 females), and these peer learners consisted of 17 Malays, five Chinese, and two Indians. Seven participants claimed to have previous experience in peer teaching programs at secondary school or matriculation. Still, the intensity, student's position in peer teaching, or the program's details were unknown. All students from Year Four ($n=12$) agreed to take the role of peer leaders (mean = 23.08 ± 1.73 years old), with eight females and four males.

Cognitive Domain Improvements

Students' cognitive improvement was assessed using OSCE 1 (week 4) and OSCE 2 (week 8) with a different set of questions related to SLBE. The test scores were calculated into percentages and were graded using UKM's standard examination grading system. The overall students' OSCE mean score for the first session was 67.92 ± 10.92 marks, and it was significantly lower than the second session (mean score = 76.30 ± 16.17 marks, $t(22) = -2.103$, $p = 0.047$). Analysis using an independent t-test showed no significant difference in the cognitive domain between the FPM group and the control group at both sessions ($p > 0.05$).

The FPM group's mean score for the first session was 70.83 ± 9.73 marks, and the control group's mean score was 65.00 ± 11.68 marks. Although the mean scores were not statistically significant, the grades achieved by the FPM group (grade B+) were different from the control group (grade B) in the first session. For the second session, the FPM group's mean score was 75.00 ± 17.88 marks, and the control group's mean score was 77.60 ± 14.95 marks. Both groups showed an increase to grade A- compared to the first session grades. Tables 1 and 2 show full results on the cognitive domain of study participants.

TABLE 1. OSCE 1 (first session) results for FPM and control groups.

<i>SESSION 1 (OSCE 1)</i>					
FPM (Group A) (n=12)		Control (Group B) (n=12)			
Mean (SD)	Grade	Mean (SD)	Grade	t(22)	P-value
70.83 (9.73)	B+	65.00 (11.68)	B	1.329	0.197
Total Mean Score for OSCE 1 = 67.92 ± 10.92 marks (Grade B)					

TABLE 2. OSCE 2 (second session) results for FPM and control groups.

<i>SESSION 2 (OSCE 2)</i>					
FPM (Group B) (n=11)		Control (Group A) (n=12)			
Mean (S.D.)	Grade	Mean (S.D.)	Grade	t (22)	P-value
75.00 (17.88)	A-	77.60 (14.95)	A-	0.370	0.715
Total Mean Score for OSCE 2 = 76.30 ±16.17 marks (Grade A-)					

Psychomotor Domain Improvements

OSPE 1 and OSPE 2 were set to measure the psychomotor domain of peer learners. The test scores were calculated into percentages and were graded by using UKM's standard examination grading system. The overall students' OSPE mean score for the first session was 70.83 ±12.72 marks (grade B+) which significantly declined in the second session (mean score= 62.50 ±14.22 marks, t(22)= 2.219, p= 0.037), equivalent

to grade B-. Further analysis showed that the OSPE mean score for the FPM group was significantly higher compared to the control group in the first session (FPM group mean score= 77.71±7.50 marks (grade A-), Control group mean score= 63.96 ±13.38 marks (grade B-), t(22)= 3.106, p<0.05). However, no significant difference was noted in the second session, with both groups attaining grade B- (refer to Tables 3 and 4).

TABLE 3. OSPE 1 (first session) results for FPM and control groups.

<i>SESSION 1 (OSPE 1)</i>					
FPM (Group A) (n=12)		Control (Group B) (n=12)			
Mean (S.D.)	Grade	Mean (S.D.)	Grade	t(22)	P-value
77.71 (7.50)	A-	63.96 (13.38)	B-	3.106	0.005
Total Mean Score for OSPE 1 = 70.83 ±12.72 marks (Grade B+)					

TABLE 4. OSPE 2 (first session) results for FPM and control groups.

<i>SESSION 2 (OSPE 2)</i>					
FPM (Group B) (n=11)		Control (Group A) (n=12)			
Mean (S.D.)	Grade	Mean (S.D.)	Grade	t (22)	P-value
60.83(15.35)	B-	64.17 (13.46)	B-	0.456	0.653
Total Mean Score for OSPE 2 =62.50 ±14.22 marks (Grade B-)					

Students' Cumulative Grade Point Average (CGPA) affects the cognitive and the psychomotor assessment

The students' CGPA may be one of the confounding factors that could have affected this study's outcome. The independent t-test was used to compare differences in the CGPA between FPM groups. Overall, the Year Three students ($n=24$) had a mean CGPA of 3.31 ± 0.35 points, and comparison between groups showed no significant difference (Group A's mean CGPA = 3.38 ± 0.40 points; Group B's mean CGPA = 3.25 ± 0.30 points, $t(22) = 0.922$, $p = 0.367$).

A correlation test was conducted to evaluate any association between CGPA and cognitive and psychomotor assessments. Spearman rank correlation showed positive, small to medium relationships between each component. However, all tested item was not significantly affected except for the correlation between CGPA and OSPE 1, which demonstrated significant medium positive relationship ($r = 0.450$, $p = 0.027$).

FPM Experiences Perceived by Peer Learners

The CTPQ was distributed to 23 peer learners who completed the FPM activity after eight weeks. Means and standard deviations for peer learners' perception of FPM are included in Table 6 for each group. Descriptive statistics showed that Item 1 (*Teaching is an important role for Optometry*) resulted in the highest mean score (mean score = 4.52 ± 0.51) out of the eleven items. In contrast, Item 2 (*I feel freer approach my instructor for help than I do my peers*) reflected the lowest (mean score = 2.83 ± 0.491). Positive acceptance of FPM, demonstrated on the scales 'agree' or 'strongly agree', can be seen in Item 4 (*I am less anxious when performing Optometric skill in the presence of my peers than my instructor*), Item 5 (*Being taught clinical skills by my peers increases my interaction & collaboration with other student more*), Item 8 (*I can communicate more freely with my peers than my instructor*), and Item 9 (*The feedback I receive from my peers is from a student's viewpoint, therefore more honest, realistic and helpful*). The Independent sample t-test indicated no significant differences in response for all items between both groups.

Our study showed significant improvements in the cognitive domain in both sessions for Group A and Group B. For the first session, Group A, who underwent the FPM session, scored higher than the control group (Group B). Both groups attained similar grades (A-) after the end of the second session, showing significant improvements for Group B, from grade B in the first

session to grade A- after the second session.

A similar achievement was noted in the psychomotor domain for Group A from the OSPE results after the first session. Group A achieved an A-grade compared to Group B with a B- grade. However, after the end of the second session, both groups obtained a B- grade, showing declined performance for Group A and no improvement for Group B. Although the psychomotor domain in the second session did not show any positive effects, FPM's practicality strengthens participants' existing knowledge and may benefit the students. This was supported by Stone et al. (2013) that justified that the social interaction and collaboration between peers play a part in an increased learning curve and acquisition of further knowledge that may not have occurred if students were studying independently.

Generally, the perceptions of peer learners towards FPM were positive in this study, in agreement with most CTPQ previous studies (Williams et al. 2014; Henning et al. 2008, McKenna & French 2011), and other specific tools, such as course evaluation, self-contentment score or satisfaction survey (Sevenhuysen et al. 2015; Burke et al. 2007). Our participants highly-rated Item 1 (*Teaching is an important role for Optometrist*), which is similar to other studies adopting CTPQ. However, the causes for a high agreement were uncertain since the Optometry program does not have a compulsory unit enforcing teaching as a professional competency. Students may value the importance of teaching in their learning as they benefit from learning and teaching others. On a different note, the lowest item rated was Item 2 (*I feel freer approach my instructor for help than I do my peers*), is incongruent with the previous finding by Williams et al. (2014). The low rating might be due to the instructor's role being limited to working hours in assisting the students while peers and/or peer leaders were accessible outside the classroom.

The other items that scored more than four points in CTPQ were considered 'agree' on that particular statement. The items were Item 4, 5, 8, and 9. Item 4 (*I am less anxious when performing Optometric skill in the presence of my peers than my instructor*) was frequently asked in other sets of survey; suggesting that they feel less anxious in learning with the assistance of peers (Williams et al. 2014; Henning et al. 2008, McKenna & French 2011, Zentz et al. 2014; Weidner & Popp 2007). The collaboration between students fosters the social impact in their learning session and allows them to practice skills without feeling embarrassed (Hammond et al. 2010). This also leads to further interaction and collaboration

with peers and was reflected in Item 5 (*Being taught clinical skills by my peers increases my interaction & collaboration with other student more than when being taught by instructor*), similar to findings by other researchers (Williams et al. 2014; Mckenna and French 2011). 'Freedom in communication between peers than instructor' on Item 8 was also rated high, aligned with studies conducted by Williams et al. (2014), Mckenna and French (2011), and Lockspeiser et al. (2008). It is possible that they felt less embarrassment in asking questions and willingly participated in discussions with peer leaders. Peer leaders may facilitate the learning process by unmasking the learner's uncertainty as they have gone through similar situations (Weidner & Popp 2007). Consequently, learners valued the feedback they received from the peer leader, reflected on their agreement response in Item 9. FPM was well accepted among optometry students for learning SLBE.

CONCLUSION

Our study's preliminary results showed a positive impact on the peer learners in our optometry student population, evident from the objective (cognitive and psychomotor assessments) and subjective (CTPQ survey) measures. Peer learners felt that they were in a 'safe' environment to learn and ask questions on the topic from their peer leaders. The FPM could be adopted in teaching a variety of skills in higher education to empower students in their own learning environment. This approach could positively impact nurturing active learning style and shifting the learning environment from teacher-centered to learner-centered. Follow up results from a different study cohort would show the feasibility and sustainability of this teaching approach.

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Mizhanim Mohamad Shahimin* & Norlaili Arif
 Optometry and Vision Sciences Program,
 Centre for Community Health Studies (ReaCH),
 Faculty of Health Sciences,
 Universiti Kebangsaan Malaysia,
 Jalan Raja Muda Abdul Aziz, 50300 Kuala Lumpur, Malaysia.

Shaz' Ain Razak
 Center of Optometry,
 Faculty of Health Sciences,
 UiTM Puncak Alam Campus,
 42300 Bandar Puncak Alam, Selangor, Malaysia.

*Pengarang untuk surat menyurat; e-mel: mizhanim@ukm.edu.my

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