Original paper

Evaluation Of Outcomes of Iraqi Medical Students' Engagement in The Community Through Project-Based Learning Approach

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Abstract

Background: The scientific engagement of medical students can be fostered by introducing the project-based learning (PtBL) strategy early in the curriculum. The PtBL approach in this study considers gestational diabetes and hypertension. However, the medical education literature does not show the short- and intermediate-term outcomes of PtBL.

Objectives: To explore the short-term and intermediate outcomes of the PtBL approach in improving medical students' academic knowledge and skills at the College of Medicine, University of Kerbala.

Methods: A mixed-method study was designed to assess the short and intermediate-term outcomes of PtBL in medical education. The project started after assessing stakeholders' needs. A four-month PtBL course was designed, which was endorsed by the curriculum committee. The study included twenty-four- 4-year medical students and ten faculty members as course facilitators. Five research teams were developed. Participation was voluntary, and informed consent was obtained from each participant. The research projects were designed to engage students in screening gestational diabetes and hypertension. The project outcomes were assessed through post-tests, mini CEX, semi-structured feedback questionnaires, and focus group discussions. Quantitative data were analyzed using SPSS, while qualitative data were analyzed using thematic (content) analysis.

Results: Most participants (98%) expressed satisfaction with the contents and delivery of the course. Ninety percent of the students reported significant improvement in their conceptual background and clinical and research-based skills. Students also reported improved teamwork, interpersonal, and communication skills. Faculty reported improvement in students' scientific engagement. All faculty recommended introducing PtBL in other areas of the curriculum.

Conclusion: The PtBL approach is an effective method to improve scientific engagement and active learning. Carefully designed projects can economically and effectively address public health problems.

Keywords: Project-based learning; Students' engagement, Curriculum Innovation.

Introduction

In most medical faculties in Iraq, scientific research is introduced late in the curriculum. Worldwide, medical educators believe medical students should be engaged in screening programs to deal with the current community health issues. However, the long-term implications of these interventions on healthcare services and the professional development of medical students are unknown. There is a lack of literature revealing the outcomes of screening programs involving medical students [(1-3)]. Thus, this project aims to assess the outcomes of this intervention on students' learning and delivery of healthcare services. The needs assessment to introduce project-based learning in the medical curriculum has been carried out through a survey, including the internal and external stakeholders. Researchers in medical education have revealed the great importance of a project-based learning approach for the innovation of medical curricula, improvement in students' learning, and public health promotion [(3)].

To our knowledge, there is a paucity of studies reported in the literature concerning medical students' engagement in the screening programs for Gestational Diabetes Mellitus (GDM) and Gestational hypertension (GH).

There are growing concerns about (GDM) and (GH) over their increasing incidence and complications for individual pregnant mothers and infants, besides their wide-scale impact on public health [(4)]. However, targeted strategies or screening programs that might significantly improve maternal and fetal health by early detecting the risk of pregnant mothers are still lacking in the clinical

field. The expected outcomes of the current project vary from short-term (students' learning outcomes) to longer-term outcomes.

College of Medicine, University of Kerbala, has adopted the integrated student-centered problem-based medical educational program [5,6]. As a part of the openness and flexibility of its program, the college council endorsed this study's application in an attempt to innovate the educational program further.

The study aimed to innovate the competency-based curriculum, improve students' skills, and promote faculty staff development in the College of Medicine at the University of Kerbala; again, the promotion of medical students and faculty performance collectively has an innovative impact on the community healthcare system in the city and all over the country.

Owing to the objectives of the study, it is expected that this project will have multiple short-term and long-term outcomes impacting the student's professional development, accomplishing the institutional mission, and improvement in the community healthcare services (details of outcomes mentioned below).

1. **Students (short-term outcomes)**

Overall satisfaction with the PtBL course, improvement in teamwork skills, evidence-based learning skills, knowledge about GDM and GH, clinical skills, communication skills, patient-interviewing skills, professional behavior, and Attitude.

2. **Institution (intermediate-term outcomes)**

Improved academic performance, faculty skills development about PtBL, and medical curriculum innovation by incorporating PtBL

Methods

A mixed research method that involved incorporating project-based learning courses into the College of Medicine University of Kerbala curriculum. Following the needs assessment form analysis, institutional bioethical approval by the Bioethical Committee of the College. The project-based learning course was developed and incorporated into 4th year medical curriculum. The course addresses the early detection of GDM and GH. Induction sessions precede the period of data collection by the student groups. Course evaluation follows for testing the achievement of early (students) outcomes.

Needs assessment form: A Likert-scaled questionnaire was designed and distributed to determine the need to implement the PtBL course. The needs assessment was shared as a Google Form, and responses from 83 responders were analyzed by quantitative and qualitative analysis of data.

Study team: The team comprised twenty-five year-4 medical students, ten faculty staff members of the College of Medicine, University of Kerbala, and the program supervisor, a FAIMER fellow 2016.

Criteria of student selection: Year 4 medical students of the College of Medicine University of Kerbala who have the will to participate in the study.

Study design: a qualitative intervention study involved PtBL course design, implementation, and evaluation.

Sample design: Twenty-five year-4 medical students, one student dismissed the course, and 24 students took part in the study. There were (5 subgroups) allowed to join the course as student-selected topics (SST) after informed consent was obtained from them. Similarly, ten faculty members were recruited as course facilitators and subgroup mentors. Under direct supervision, Students collected the data from at-risk pregnant women according to their research proposals.

Data collection and analysis plan: Data from responses to questionnaires shared as Google forms on the telegram groups of the students. Institutional consent preceded that; the student's consent was included in the forms' preface. Needs assessment form responses were collected and statistically analyzed. Five different proposals were performed by the teams representing the graduation research. Students collected the data from at-risk pregnant women after ensuring institutional and personal consent. Measurement of blood pressure and blood sugar done according to the standard guidelines.

Course design: A four-month course with 2-week induction phase pertaining to research methodology and specific sessions in the field of gestational diabetes and hypertension. This was followed by three months of team formulation, proposal designing, and data collection. Lastly, every team made a presentation of projects at the end of the course.

Course Evaluation: Well-structured course evaluation forms as questionnaires assessed according to a 5-point Likert scale. These forms were distributed and answered by the study participants: 24 students and 10 faculty members. The questionnaire had some open-ended questions and text-based comments concerning certain areas of the course. Responses to course evaluation forms were harvested and analyzed accordingly via the content analysis method for the qualitative data.

The biostatistical package SPSS was applied throughout the project to analyze quantitative data obtained from the abovementioned tools.
Short-term outcomes related to the students and institution have been investigated and accomplished. In contrast, longer-term outcomes concerning the community will be accomplished later.

Teams' project findings: The results obtained from teams' research were collected and analyzed. Titles of the projects, team members, and supervisors are listed in Table 1.

Results

Quantitative: Needs assessment form

Qualitative analysis of data from the needs assessment form (responded by 83 persons: 15 medical students and 63 medical faculty members and 7 doctors from the health sector) was performed prior to the beginning of the project. Analysis of responses to the needs assessment form is shown in figures 1-4.

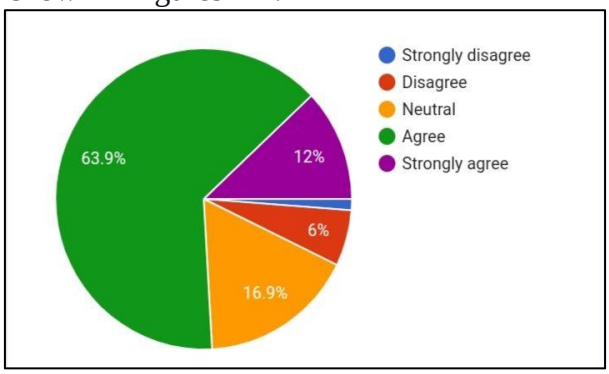

Figure 1. Responses to the question "Can the project-based learning course be implemented through the available resources?"

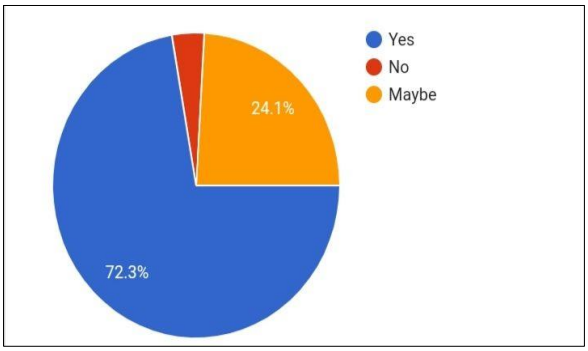

Figure 2. Responses of the question "Is it a good idea to engage medical students in screening programs by assigning them those Project-based learning course?"

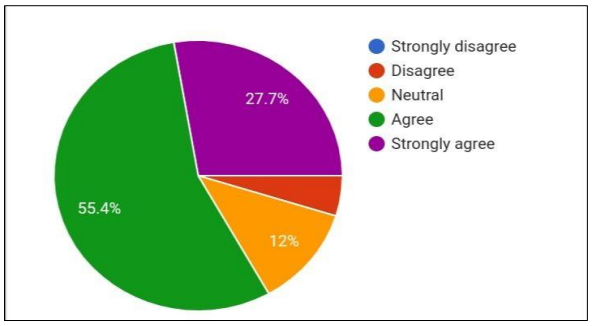

Figure 3. Responses about the goal: "By introducing project-based learning in the medical curriculum, the institutional mission of producing clinically competent doctors can be achieved".

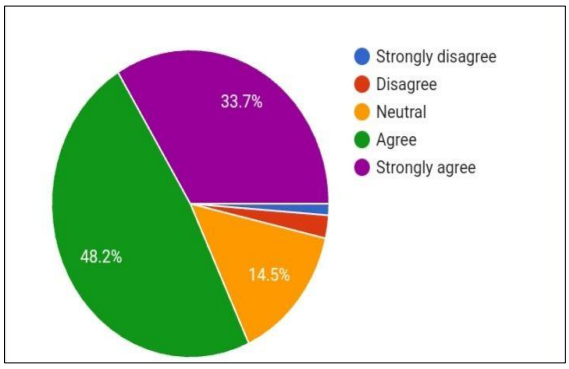

Figure 4. Responses to the question "Do you recommend project-based learning in the medical curriculum of the College of Medicine, University of Kerbala?"

Course evaluation forms

Data analysis of responses to Likert's scaled questionnaires and course evaluation forms by 30-course participants, 24 students, and 10 faculty members. are as follows (According to the short-term outcomes).
Overall satisfaction with project-based learning courses by the faculty members and students appeared to be 79% for "good" and 21% for "satisfactory."
Regarding the quality of course contents, the participants revealed the following results as shown in Table 2."
Regarding the contribution of the course to students' learning, the respondents reveal improvement in teamwork skills, evidence-based learning skills, knowledge, clinical skills, and communication skills.
The details of the responses are shown in Table 3.

Table 1. List of titles of the projects, team members and supervisors enrolled in PtBL course.

Projects Titles	Students	Supervisors
Prevalence of gestational diabetes mellitus (GDM) in pregnant women above 30 years aged in holy city of Kerbala	R A Sadek Z H Sobhi F H Kamal Z Jameel	Mousa Muhsin Azdihar Sahmi
Outcome of female with severe preeclampsia admitted to Kerbala maternity hospital	B J Mohsen R H Makki A K Abbas M J Ali M M Mohamed	Muna Qasim Maysaloon Adnan
Surveying the therapeutic interventions for glycemic control of gestational diabetes in a sample of Iraqi patients, a cross-sectional study	T A Nasser J K Fadel A Kadhim W Y Jarir Z Ahmed	Mudhaffar Sami Wasan Gazi
Complications of pregnancy induced hypertension in Kerbala and Babil maternity hospitals 2021, a cross-sectional study	A M Nouri A M AbdElKarim Z K Mousa N R Shakir N S Sabah	Shahrazad S Al Jubouri Ali Mansoor
Prevalence of Gestational Diabetes in Obese Pregnant Women in the Karbala	A Y Sahib A Malik M A Abd ElMoneim W Alaa A A Hameed	Noora Sabah Manal Nasih

Table 2. Responses regarding quality of PtBL course contents.

Feature of course contents	Strongly disagree	Disagreed	Neutral	agree	Strongly agree
Course learning objectives were clear	-	-	7	21	6
Course contents organized and well-planned	-	-	5	21	8
Knowledge about GDM and GHT	-	-	4	22	8
Course workload was appropriate	-	-	6	19	9
Course organized to allow all students to participate fully	-	-	5	12	17

Table 3. Responses regarding contribution of PtBL course to students' learning, n=24.

Contribution of PBL course to learning; improvement of	Poor	Fair	Satisfactory	very good	excellent
Team work skills	-	-	16.6%	60.1%	23.3%
Clinical skills	-	3.3%	10%	70.1%	16.6%
Knowledge	-	-	16.6%	73.4%	10%
Communication skills	-	-	13.4%	56.6%	30%
Evidence-based learning skills	-	-	6.6%	73.4%	20%

On the other hand, 63.6% of the participants agree, and 36.4% strongly agree to recommend incorporating the course into the curriculum.

Qualitative Results:

According to the participants' perceptions (students and facilitators) obtained from the course evaluation form, findings include the following:

The most useful or valuable aspects of this course were as follows:

Data collection.

Experience added to our skills, teamwork, and enthusiasm.

Communication skills.

The contact, introduction, and communication with the students.

Understanding complications of hypertension in pregnancy.

A new experience that adds to our knowledge of student's self-discipline and confidence improvement.

Suggestions to improve this course:

Increase the course participant number.

Improve the timetable for PtBL tasks to be suitable for other homework and lectures.

More close observation of the students during information gathering and data collection to correct any mistakes.

Extend the duration of collecting data.

By giving more interactive sessions and more fieldwork.

Prolong the duration of the course.

Prepare the students for research methodologies in a more advanced way.

Teams' projects findings:

Results from the teams' research aid a lot in community health promotion. Investigation of variable aspects of gestational diabetes and hypertension mediate early diagnosis and follow-up of such complications in pregnant women. Findings and recommendations of these research could be employed to improve pregnant women's health and, eventually, safer pregnancy.

Discussion

The current study's findings revealed a need to incorporate a PtBL course in the medical curriculum, at least in Iraqi medical schools, as it seems a good alternative for classic graduation research. Several previous studies concluded this. Such studies include the incorporation of PtBL courses into a single medical discipline, such as pharmacology [7], occupational health [8], neuroscience [9], and microbiology [10]. However, no previous study concerns the PtBL approach in Iraqi medical schools. In addition, other medical education studies recommended applying the PtBL approach in multidisciplinary modules in medical curricula [7, 11-13]. This finding is not limited to pure medical curricula but also includes other supporting fields like nursing colleges [14] and schools of pharmacy [15].

Regarding course satisfaction, the majority of the participants in the current study were satisfied with the PtBL course, and this is consistent with a study in India, in which feedback from 134 students revealed that more than 78% of students were satisfied and 12% students were neutral for project-based approach, while only about 9% were dissatisfied with this course. [4]

Another outcome of implementing the PtBL course noted by the current study is the noticeable improvement in the student's knowledge, skills, and attitudes. This finding is parallel to that of other studies concerning these outcomes. A previous study revealed that significant improvement in knowledge was observed following a PtBL course in pharmacology [7]. Another study revealed that the students' innovation of public service motivation via the PtBL approach in a community nutrition course [16]. Another study proved that applying the PtBL course improved medical students' empathy toward patients [17]. Furthermore, it was found that incorporating such courses improved the research methodology experience of the enrolled medical students [18].

Another cohort found that the average marks scored in the pretest and post-test were 17.65 and 29.31, respectively. The mean difference test was 11.655, with a 66.04% improvement in the score. The students opined that the PtBL strategy was very interesting, enhanced their ability, activated their prior knowledge, and helped them to elaborate and organize their knowledge. Project-based learning made the integration of different disciplines a reality. Self-directed learning was promoted. The students worked together as a team more effectively [3]

In conclusion, the PtBL approach is an innovative add-on learning strategy. It effectively improves students' engagement in the community and mediates active learning in reality. Longer-term conclusions can be made via analysis of the results of teams' research to prove maternal health-related outcomes. Projects concerning different health problems and actively engaging medical students can promote public health.

Our findings showed that a project-based learning course is recommended as an innovative teaching style to be incorporated into the undergraduate medical curriculum.

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