Knowledge and Attitude Towards Biomedical Science Career Options Among Biomedical Science Undergraduate Students in International Islamic University Malaysia

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Abstract:

Biomedical sciences are a group of sciences that use elements of natural science, formal science, or both to develop knowledge, interventions, or technology for use in healthcare or public health. Biomedical Science covers a wide range of fields of research that focuses on healthcare-relevant fields of biology and chemistry. The rate of biomedical science IIUM graduate employability in 2020 was 70.7% (GE, 2014). This cross-sectional study aimed to determine the level of knowledge and attitude towards biomedical science career options among Biomedical Science undergraduate students in IIUM Kuantan, and the association between the knowledge & attitude career option awareness. This study involved 89 respondents randomly chosen based on specific criteria. Data was collected through the distribution of questionnaires online and data was analyzed using Statistical Package for Social Sciences (SPSS) version 22. From this study, it can be summarized that the Biomedical Science undergraduate students in International Islamic University Malaysia (IIUM) Kuantan have a good level of knowledge and moderate attitude towards biomedical science career options. Significant relationships were found between knowledge and attitude towards career options among the respondents. Overall, it can be concluded that adequate attitude led to the good knowledge of the respondents, yet additional preparations for a great variety of careers from research and the sciences to entrepreneurship may boost the employability rate of the Biomedical Science graduates.

Keywords: Biomedical Science, graduate employability, career options

Introduction:

Biomedical Science is an area of research and work that is challenging, yet rewarding (Sohail, 2013). In Malaysia, Allied Health Professions (AHP) have an incomplete, unbalanced deployment, and an oversupply (Rotem et al., 2020). Several facilities are overburdened, and human capital is in short supply.

In 2019, there have been no new jobs for AHP graduates from the Ministry of Health Training Institutions (MOH, 2020). It is also a slow career pathway because depending on the availability of positions, the promotion possibilities for AHP are limited and differ between professions. According to the MOH, the number of biomedical scientist graduates required each year is 16, but the estimated number of graduates per year is 891. In 2017, there were 920 biomedical scientist graduates, but 77 graduates only were employed by the Ministry of Health. As a result, this led to a moderate percentage of graduate employability among biomedical science IIUM Kuantan graduates in 2020 which was 70.7% (GE, 2014). Therefore, students need to be aware of other career options in the biomedical science field to select the best career path for their future.

Besides career options, the attitude of graduates contributes to graduate employability across the disciplines. According to Goetsch et al. (2017), students who start the job search process early have higher levels of self-efficacy and more positive attitudes towards the career search process. In a competitive employment marketplace, students need to be well prepared to get a job. With so many possibilities, it is difficult for students to make a decent decision since they are often confused about what they can do. They need to grasp and practice the skills that they have learned. Therefore, this study focuses on the knowledge and attitude towards biomedical science career options among Biomedical Science undergraduate students in IIUM Kuantan.

Materials and Methods:

Ethical Approval

Ethical approval was obtained from Kulliyyah Postgraduate and Research Committee (KPGRC), Kulliyyah of Allied Health Sciences and followed by approval from IIUM Research Ethical Committee (IREC).

Study Design

The study was a cross-sectional study, aimed to evaluate the knowledge and attitude towards biomedical science career options among Biomedical Science undergraduate students in IIUM Kuantan. This study was conducted from January until July 2021.

Sample Size

The single proportion formula was used to determine the sample size by calculating the number of respondents needed in this study. The proportion in the population used for this study was from the rate of biomedical science IIUM graduate employability in 2020 which was 70.7% (GE, 2014). The total number of respondents for this study was 89 respondents including 10% of non-response rate.

Sampling Method

This quantitative study employed a convenience sampling.

Inclusion Criteria

All biomedical science undergraduate students, Years 1-4 were included in the study.

Exclusion Criteria

A student who cannot read or understand English, and Biomedical science staffs and postgraduate students of IIUM Kuantan campus were excluded from this study.

Questionnaire Development

The questionnaire consisted of two sections. The first section dealt with socio-demographic information, such as the respondents' age, year of study, religion, gender, race, family monthly household income, and marital status. Items in the second section addressed knowledge and attitudes towards biomedical science career options among Biomedical Science undergraduate students in IIUM Kuantan, and each component had 12 items. The 'True', 'False', and 'Unsure' options will be part of the knowledge for career options in Biomedical Science. Correct answers received one point, while incorrect and unsure responses received zero points. A typical 5-category Likert scale with Strongly Disagree, Disagree, No Opinion, Agree, and Strongly Agree options used to measure students' attitude towards biomedical science career options. The marks for each option were graded from five to zero, starting with Strongly Agree

and ending with Strongly Disagree. The questionnaire was written entirely in English.

Pilot Study

A pilot study was done with 15 IIUM Kuantan biomedical science students. The total item measured in this test were 24 items. A reliability analysis test was conducted and yielded a Cronbach's Alpha score of 0.659 for knowledge and 0.831 for attitude.

Data Collection

Data collection was done from February and July of 2021. Consent from the respondents was obtained directly at the beginning of online survey.

Data Analysis

The data was interpreted using the Statistical Package for Social Sciences (SPSS). Descriptive statistics was used to determine frequency and mean scores. ANOVA was used to determine the association of socio-demographic characteristics level of knowledge and attitude towards biomedical science career options. Correlation analysis was used to explore the correlation between knowledge and attitude scores.

Results:

Socio-Demographic Characteristics of Participants

Table 1 provides an overview of socio demographic characteristics. The majority of the respondents were aged 22 to 25 years old (60.7%) and female (83.1%). All respondents were Muslims and Malay. Third year students accounted for 47.2% of the respondents. All respondents were single. 52.7% of respondents came from B40 households with an average household income of RM 4850.

Table 1 Socio-Demographic Characteristic of Respondents (n=89)

Demographic Characteristics	Frequency	Percentage (%)
Age		
19-21	35	39.3
22-25	54	60.7
Year of Study		
Year 1	24	27.0
Year 2	13	14.6
Year 3	42	47.2
Year 4	10	11.2
Gender		
Female	74	83.1
Male	15	16.9
Races		
Malay	88	98.9
Chinese	0	0
Indian	0	0
Others	1	1.1
Family Monthly Household Income		
B40 (<RM4850)	47	52.8
M40 (RM4850-RM10959)	28	31.5
T20 (>RM10959)	14	15.7

Note. The total of the highest frequency from each category is highlighted in bold.

Level of Knowledge and Attitude towards Biomedical Science Career Options

Table 2 shows the frequencies of responses to the knowledge items. The first two questions were on the job scope of biomedical science, and the majority of the respondents knew very well that they can choose various career options after graduating. The respondents also understood that career exposure will assist them in taking action to pursue their chosen career and that a career in biomedical science necessitates a diverse set of skills. Meanwhile, most respondents were unaware of the number of allied health science professions covered by the Ministry of

Health. They were also unsure of the chances of getting a job after graduation (Items 9-11).

Table 2 Distribution of Knowledge towards Biomedical Science Career Options among Biomedical Science Undergraduate Students (n=89)

Statement	True Freq. (%)	False Freq. (%)	Unsure Freq. (%)
Biomedical Science students have various career options upon graduation.	**82 (92.1)**	0 (0.0)	7 (7.9)
There is a wide scope for Biomedical Science graduates in research, hospital, sales and academia.	**85 (95.5)**	0 (0.0)	4 (4.5)
Career exposure students take action to achieve their dream career.	**88 (98.9)**	0 (0.0)	1 (1.1)
A Biomedical Science career requires a variety of skills.	**83 (93.3)**	0 (0.0)	6 (6.7)
I can achieve information on career options through various platforms, such as the internet, books, and magazines, among others.	**76 (85.4)**	2 (2.2)	11 (12.4)
Biomedical scientists are responsible for investigating and diagnosing patient illnesses such as HIV, cancer, diabetes, food poisoning, hepatitis, and meningitis.	**67 (75.3)**	9 (10.1)	13 (14.6)
Biomedical scientists can work in three areas: infection sciences, blood sciences and cellular sciences.	**63 (70.8)**	2 (2.2)	24 (27.0)
A background in Biomedical Science ensures that you develop the skills and mindset to tackle many different career challenges.	**75 (84.3)**	2 (2.2)	12 (13.5)
There are 23 categories of allied health science professions under the Ministry of Health which include three main core such as clinical, health and general laboratory services.	**23 (25.8)**	1 (1.1)	65 (73.0)
Biomedical science includes industrial experience such as internships.	**84 (94.4)**	1 (1.1)	4 (4.5)
It is easy to get a job upon graduation with this qualification.	15 (16.9)	**14 (15.7)**	60 (67.4)

Biomedical science will play an important role in healthcare delivery.	**86 (96.6)**	0 (0.0)	3 (3.4)

Note. Freq. = Frequency

Association of Socio-Demographic Factors with Knowledge and Attitude towards Biomedical Science Options

Knowledge scores across different socio-demographic variables was analysed using the one-way ANOVA test and the independent samples t-test. Results are shown in Table 4. Analyses revealed a statistically significant difference in mean knowledge score between the two age groups with the 22-25 age group having a slightly higher mean score. No significant differences were found between gender, year of study and family monthly household income.

Table 4 Association between Socio-Demographic Characteristic with Knowledge Scores (n=89)

Variable	Mean	*p*-value
Age		0.033[a]
19-21	8.971	
22-25	9.389	
Gender		0.734[a]
Female	9.243	
Male	9.133	
Year		0.768
Year 1	9.208	
Year 2	8.923	
Year 3	9.214	
Year 4	9.700	
Family monthly household income		0.298
B40 (< RM4850)	9.383	
M40 (RM4850 – RM10959)	9.286	
T20 (> RM10959)	8.571	

Note. (a) Tested with Independent t-test

Attitude scores across different socio-demographic variables was analysed using the one-way ANOVA test and the independent samples t-test (Table 5). Statistically significant differences in attitude scores was determined between the years of study with Year 4 having the highest mean (M = 46.1)

Table 5 Association between Socio-Demographic Characteristic with Attitude Scores (n=89)

Variable	Mean	*p*-value
Age		0.658[a]
19-21	40.743	
22-25	40.352	
Gender		0.369[a]
Female	40.297	
Male	41.533	
Year		0.004
Year 1	42.375	
Year 2	40.000	
Year 3	38.262	

Year 4	46.100	
Family monthly household income		0.052
B40 (< RM4850)	42.192	
M40 (RM4850 – RM10959)	38.536	
T20 (> RM10959)	38.786	

Note. (a) Tested with Independent t-test

Category of Knowledge and Attitude

According to the knowledge score, the majority of respondents have a good level of knowledge about biomedical science career options and a fair attitude toward biomedical science career options.

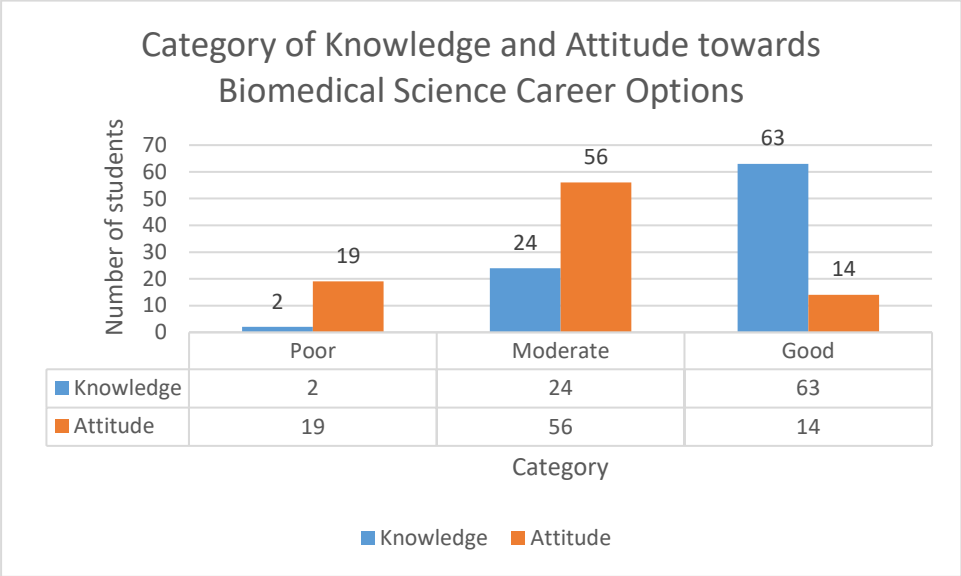

Figure 1 Category of Knowledge and Attitude towards Biomedical Science Career Options among the Respondents

Correlation between Knowledge and Attitude towards Biomedical Science Career Options

There was a weak correlation between knowledge and attitude towards Biomedical Science career options (p = 0.006). Figure 2 presents a scatter plot that illustrates the correlation between knowledge and attitude scores.

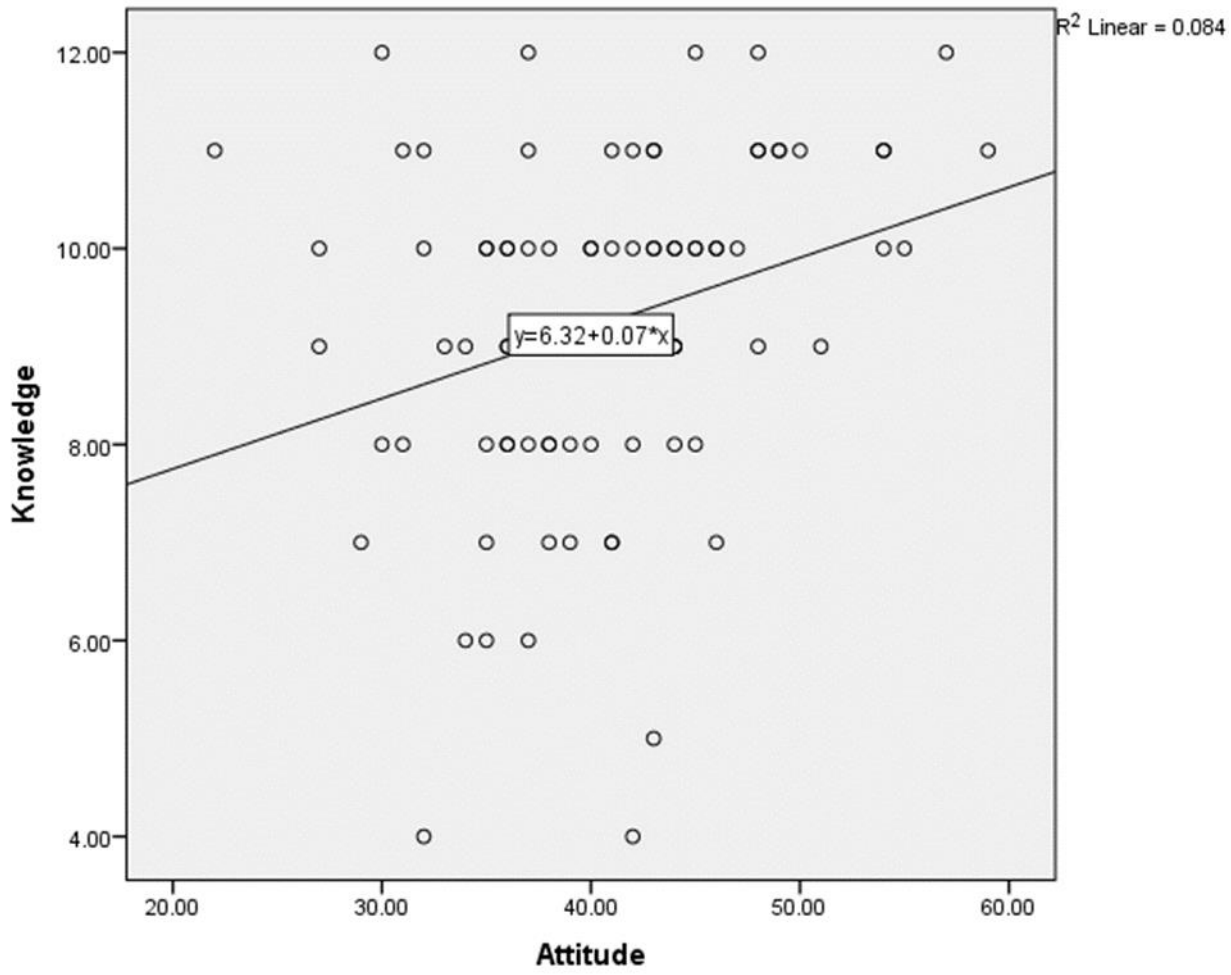

Figure 2 Correlation between Knowledge and Practice towards Biomedical Science Career Options among Biomedical Science Undergraduate Students

Discussion:

A bachelor degree in biomedical science can lead to careers in education, research, sales and marketing, as well as hospital and institutional work (NUHS Team, 2020). Graduate education in biomedical sciences is increasingly recognizing that while it is effective in teaching students how to conduct research, it falls short in educating them for a broad job market, interacting with the public, and being adaptable scientists throughout their careers (Bosch & Casadevall, 2017). This study aimed to evaluate the level of knowledge and attitude towards biomedical science career options among Biomedical Science undergraduate students in IIUM Kuantan. As a result, the sources of knowledge and attitude towards biomedical science career options can be recognized, and the student's benefits or disadvantages can be assessed. From this study, the graduates can identify their strength and weaknesses, and prepare the needful to seek employment, such as enhancing their skills to plan, conduct and evaluate experiments, as well as equipping themselves with knowledge on health and safety rules and regulations. Biomedical Science graduates may also join the workforce as science writers or as pharmaceutical sales representatives and marketers. Hence, Biomedical Science undergraduates must be versatile and willing to learn on these career options. Besides opting to pursue advanced degrees, many graduates choose to be in the line of research. Hence, Biomedical Science undergraduates need to be open to this choice and explore the opportunity in this field. Several of these career options may require additional education or preparation in the form of courses or examinations. However, these preparations may help the Biomedical Science students to achieve a better employability rate upon graduation.

The first objective of this study was to assess the knowledge and attitude towards biomedical science

career options among Biomedical Science undergraduate students in IIUM Kuantan. The knowledge level among Biomedical Science undergraduate students at IIUM Kuantan was good, accounting for 70.8 % of respondents. However, the attitude level among Biomedical Science undergraduate students at IIUM Kuantan was moderate, with 62.9 % of respondents.

The second objective of this study was to measure the association between the related factors with knowledge and attitude towards biomedical science career options among Biomedical Science undergraduate students in IIUM Kuantan. Female students outperformed male students on average when it came to biomedical science career options knowledge, as seen in Table 4. Year 4 scored better on average for knowledge towards biomedical science career options compared to Year 1, Year 2, and Year 3. The B40 group scored better on average for knowledge towards biomedical science career options rather than M40 and T20. Meanwhile, as seen in Table 5., male students outperformed female students on average when it came to biomedical science career options attitude. Furthermore, Year 4 outperformed Year 1, Year 2, and Year 3 in terms of attitude toward biomedical science career options. In comparison to M40 and T20, the B40 group scored higher on average for attitude toward biomedical science career options.

Gender differences score of knowledge and attitude towards career options determined by self-efficacy, outcome expectations, and personal aspirations created by academic accomplishments. Lack of job opportunities and challenges entering the labor market leads to a tendency of B40 groups to score higher on average for knowledge and attitude toward biomedical science career options. By referring to the results in Table 4. and Table 5, it is suggested that there was no association between all the socio-demographic factors with the knowledge and attitude towards biomedical science career options among the respondents. However, there was an association between age and knowledge towards biomedical science career options (p= 0.033) and year of study with attitude towards biomedical science career options (p= 0.004). These findings are expected as students gain better knowledge about Biomedical Science and its applications as they progress in their studies.

The third objective of this study was to identify the correlation between knowledge and attitude towards biomedical science career options. There was a weak but significant linear correlation between knowledge and attitude towards biomedical science career options (p=0.006). In this study, the positive correlation between knowledge and attitude reaffirmed the relationship between these elements. That proper attitude is associated with good knowledge.

Conclusion:

In conclusion, Biomedical Science undergraduate students at the International Islamic University Malaysia (IIUM) Kuantan have a good level of knowledge and moderate attitudes towards biomedical science career options. Significant relationships were found between knowledge and attitude towards career options among the respondents, which depicted the adequate attitude that has led to the good knowledge of the respondents. There were notable limitations in study, and the obvious were cultural bias (most of the respondents were Malaysians Malays) and being too population-specific (involving IIUM undergraduates only). There were also lack of prior research studies on this topic based on Malaysian undergraduates. From this study, it is suggested that educational institutions that offer the Biomedical Science Progamme, can encourage additional preparations for a great variety of careers that range from research to entrepreneurship to boost the employability rate and career options available to Biomedical Science graduates.

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