Perception among Future Healthcare Providers about Treatment and Management of ALS

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Authors’ contributions

This work was carried out in collaboration among all authors. Authors MZI and MSI designed the study, performed the initial statistical analyses and wrote the protocol. Authors SDK, EMS and MSI wrote the first draft of the manuscript. Authors MZI, EMS and MSI managed refined analyses. Authors SDK and MSI revised the manuscript. All authors read and approved the final manuscript.

ABSTRACT

Objective: The objective of the study was to determine the perception of future healthcare providers regarding Amyotrophic Lateral Sclerosis (ALS) in a private medical university.

Methods: A cross-sectional study was conducted using a convenience sampling method. A self-developed and pre-validated tool was used to collect data from students studying in three health care faculties of a university in Malaysia. The Statistical Package for Social Science (SPSS) Version 24.0 was used to analyze the data.

Results: A total of 268 healthcare students from three faculties (medical, pharmacy and dental) participated in the current study. More female students 183 (68.3%) participated than the male students 85 (31.7%) in current study.

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Conclusion: Overall appropriate perception was observed among the studied future healthcare providers. The present study concluded that pharmacy students had more positive perception regarding ALS than the rest of the participants.

Keywords: Amyotrophic lateral sclerosis; ALS; perception; future healthcare providers.

1. INTRODUCTION

Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative illness that distresses nerve cells situated in the brain and the spinal cord [1]. Initial indicators of ALS contain increasing muscle cramps, muscle weakness, and difficulty in walking or performing usual everyday activities [2]. Recognized risk factors for ALS contain age, sex, heredity, lead exposure, protein mishandling and smoking [3]. A significant problem in the diagnosis of ALS is the absenteeism of biomarkers, which results in delayed diagnosis from 9 to 12 months and lead to a false diagnosis in 10% of cases [4]. There are 4 different types (onsets) of ALS which are bulbar onset, pulmonary onset, upper limbs onset and lower limbs onset that usually determine the real severity of the ALS among its patients. These all four onset types often result in different clinical manifestations, disease severity and its overall management [1-4].

Complications especially aspiration are mainly result in major problems like difficulties in speaking, breathing, eating, dementia and getting food, saliva, or liquid into the lungs [5]. Some patients of ALS may have a tracheostomy in the later stages [6]. However, respirational failure is the most common reason for death in ALS patients [7]. Furthermore, low levels of vitamin D and the eating problem can cause dehydration and malnutrition in patients of ALS [8]. On the other hand, the rate and severity of aspiration may also get higher in patients of ALS [9].

Although no proper management for ALS is available until now, yet managing glial cells deficiency which often lacks specific proteins and becomes sick, and maintenance of vitamin D, E and C could be considered as a supportive management of ALS. Additionally, Riluzole is considered as one of the FDA approved drugs that can decrease the progression of ALS in patients [10]. Riluzole mechanism is to reduce the levels of glutamate that is generally available at high levels in patients of ALS [11]. Since ALS is not a very well-known illness, and future health care providers may not be fully aware of it but they should have an appropriate and positive perception of ALS. They must have practical information to control any outbreaks in the upcoming future. The present study was conducted to evaluate the perception of future healthcare providers in medical, dental, and pharmacy students on ALS in a private medical university in Malaysia.

2. METHODOLOGY

A cross-sectional study was conducted between future healthcare providers in a private medical university in Malaysia by a pre-validated research questionnaire. A stratified convenience sampling technique was used to calculate the sample size of the participants. The calculated sample size was 300 participants from medical, pharmacy, and dental faculties of a private medical university. All of the included participants of the current study were requested to read and understand the question statements before selecting the answer based on their best understanding. The gained scores were construed as a percentage response to ease the data presentation.

Statistical Package for Social Science (SPSS) version 24.0 was utilized for Data analyses and presentations. Frequencies with percentages were considered for the categorical variables. The Pearson Chi-Square/Fisher’s Exact Test was used to find out the p-value in variables. A p-value of < 0.05 was considered statistically significant. Phi Cramer’s value was used to find the effect size of the statistically significant variables. The results of effect size were as per the Crohn’s classification for categorical data.

3. RESULTS

A total of 268 healthcare students from three faculties (medical, pharmacy and dental) participated in the current study. Demographic of the current study was different, including gender, race, faculty, age, year of education, residence and education background. The demographic variables are accessible in Table 1.

Perception Question 1: Transplanting healthy glial cells into patients could be a possible treatment of ALS.
Table 1. Demographic Information of Respondents

| Variables          | N    | %   |
|--------------------|------|-----|
| **Gender**         |      |     |
| Male               | 85   | 31.7|
| Female             | 183  | 68.3|
| **Race**           |      |     |
| Malay              | 2    | 0.7 |
| Chinese            | 190  | 70.9|
| Indian             | 75   | 28.0|
| Others             | 1    | 0.4 |
| **Faculty**        |      |     |
| Medical            | 83   | 31.0|
| Pharmacy           | 100  | 37.3|
| Dental             | 85   | 31.7|
| **Age**            |      |     |
| 20-25              | 262  | 97.8|
| 26-30              | 5    | 1.9 |
| More than 30       | 1    | 0.4 |
| **Year of Education** |    |     |
| Year 3             | 95   | 35.4|
| Year 4             | 130  | 48.5|
| Year 5             | 43   | 16.0|
| **Residence**      |      |     |
| Hostellers         | 185  | 69.0|
| Non-hostellers     | 83   | 31.0|
| **Education Background** | |     |
| A Level            | 7    | 2.6 |
| Diploma            | 5    | 1.9 |
| Foundation         | 230  | 85.8|
| STPM*              | 26   | 9.7 |

*STPM = Malaysian Higher School Certificate

A statistically significant difference (p=0.049) was observed between response of question 1 and age variable. The proportion of correct answer was more in the 20-25 years old as compared with the others. A weak positive association ($\phi=0.012$) was observed between faculty variable and the response of the students.

**Perception Question 2:** Riluzole is often recommended in the management of ALS.

A statistically significant difference was observed between the response of question 2 and faculty (p=0.006), year of education (p=0.009) and residence (p=0.032) variable. The proportion of correct answer was more in medical students as compared with the others. A weak positive association ($\phi=0.051$) was observed between faculty variable and response of the students.

**Perception Question 3:** Lower levels of vitamin D put older adults at a higher risk of acquiring ALS.

A statistically significant difference was observed between response of question 3 and faculty (p=0.003) and residence (p=0.029) variable. The proportion of correct answer was more in dental students as compared with the others. A weak positive association ($\phi=0.062$) was observed between faculty variable and response of the students.

**Perception Question 4:** Smoking is a risk factor for ALS.

A statistically significant difference was observed between response of question 4 and faculty (p=0.002) and residence (p=0.018) variable. The proportion of correct answer was more in dental students as compared with the others. A weak positive association ($\phi=0.029$) was observed between residence variable and response of the students.

**Perception Question 5:** Hearing therapy is of no use in treating ALS patients.
A statistically significant difference was observed between response of question 5 and faculty \((p=0.001)\) and year of education \((p=0.018)\) variable. The proportion of correct answer was more in dental students as compared with the others. A moderate positive association \((\phi=0.571)\) was observed between residence variable and response of the students.

Table 2. Perception of respondents to question 1

| Variables            | Wrong answer N (%) | Right answer N (%) | P value \(^*\) | Effect size \(^#\) |
|----------------------|--------------------|--------------------|----------------|------------------|
| Gender               |                    |                    |                |                  |
| Male                 | 64 (75.3)          | 21 (24.7)          | 0.238          | -                |
| Female               | 138 (75.4)         | 45 (24.6)          |                |                  |
| Race                 |                    |                    | 0.059          | -                |
| Malay                | -                  | 2 (100.0)          |                |                  |
| Chinese              | 150 (78.9)         | 40 (21.1)          |                |                  |
| Indian               | 51 (68.0)          | 24 (32.0)          |                |                  |
| Others               | 1 (100.0)          | -                  |                |                  |
| Faculty              |                    |                    | 0.071          | -                |
| Medical              | 62 (74.7)          | 21 (25.3)          |                |                  |
| Pharmacy             | 77 (77.0)          | 23 (23.0)          |                |                  |
| Dental               | 63 (74.1)          | 22 (25.9)          |                |                  |
| Age                  | 0.049              | 0.012              |                |                  |
| 20-25                | 198 (75.6)         | 64 (24.4)          |                |                  |
| 26-30                | 3 (60.0)           | 2 (40.0)           |                |                  |
| More than 30         | 1 (100.0)          | -                  |                |                  |
| Year of Education    |                    |                    | 0.484          | -                |
| Year 3               | 71 (74.7)          | 24 (25.3)          |                |                  |
| Year 4               | 97 (74.6)          | 33 (25.4)          |                |                  |
| Year 5               | 34 (79.1)          | 9 (20.9)           |                |                  |
| Residence            | 0.612              |                    |                |                  |
| Hostellers           | 140 (75.7)         | 45 (24.3)          |                |                  |
| Non-hostellers       | 62 (74.7)          | 21 (25.3)          |                |                  |
| Education Background | 0.061              |                    |                |                  |
| A Level              | 3 (42.9)           | 4 (57.1)           |                |                  |
| Diploma              | 3 (60.0)           | 2 (40.0)           |                |                  |
| Foundation           | 173 (75.2)         | 57 (24.8)          |                |                  |
| STPM                 | 23 (88.5)          | 5 (11.5)           |                |                  |

\(^*\)Pearson Chi-Square; \(^#\)Phi Cramer’s V

Table 3. Perception of respondents to question 2

| Variables            | Wrong answer N (%) | Right answer N (%) | P value \(^*\) | Effect size \(^#\) |
|----------------------|--------------------|--------------------|----------------|------------------|
| Gender               |                    |                    | 0.134          | -                |
| Male                 | 63 (74.1)          | 22 (25.9)          |                |                  |
| Female               | 141 (77.0)         | 42 (23.0)          |                |                  |
| Race                 | 0.062              |                    |                | -                |
| Malay                | 2 (100.0)          | 0 (0.0)            |                |                  |
| Chinese              | 146 (76.8)         | 44 (23.2)          |                |                  |
| Indian               | 55 (73.3)          | 20 (26.7)          |                |                  |
| Others               | 1 (100.0)          | 0 (0.0)            |                |                  |
| Faculty              | 0.006              | 0.051              |                |                  |
| Medical              | 59 (71.1)          | 24 (28.9)          |                |                  |
| Pharmacy             | 80 (80.0)          | 20 (20.0)          |                |                  |
| Dental               | 65 (76.5)          | 20 (23.5)          |                |                  |
| Age                  | 0.079              |                    |                | -                |
| 20-25                | 200 (76.3)         | 62 (23.7)          |                |                  |
| 26-30                | 3 (60.0)           | 2 (40.0)           |                |                  |
| More than 30         | 1 (100.0)          | 0 (0.0)            |                |                  |
Table 4. Perception of respondents to question 3

| Variables                  | Wrong answer N (%) | Right answer N (%) | P value* | Effect size |
|----------------------------|--------------------|--------------------|----------|-------------|
| Gender                     |                    |                    |          |             |
| Male                       | 52 (61.2)          | 33 (38.8)          | 0.256    | -           |
| Female                     | 112 (61.2)         | 71 (38.8)          |          |             |
| Race                       |                    |                    |          |             |
| Malay                      | 1 (50.0)           | 1 (50.0)           | 0.055    | -           |
| Chinese                    | 114 (60.0)         | 76 (40.0)          |          |             |
| Indian                     | 48 (64.0)          | 27 (36.0)          |          |             |
| Others                     | 1 (100.0)          | -                  |          |             |
| Faculty                    |                    |                    | 0.003    | 0.062       |
| Medical                    | 55 (66.3)          | 28 (33.7)          |          |             |
| Pharmacy                   | 60 (60.0)          | 40 (40.0)          |          |             |
| Dental                     | 49 (57.6)          | 36 (42.4)          |          |             |
| Age                        |                    |                    | 0.089    | -           |
| 20-25                      | 163 (62.2)         | 99 (37.8)          |          |             |
| 26-30                      | 1 (20.0)           | 4 (80.0)           |          |             |
| More than 30               | -                  | 1 (100.0)          |          |             |
| Year of education          |                    |                    | 0.219    | -           |
| Year 3                     | 57 (60.0)          | 38 (40.0)          |          |             |
| Year 4                     | 81 (62.3)          | 49 (37.7)          |          |             |
| Year 5                     | 26 (60.5)          | 17 (39.5)          |          |             |
| Residence                  |                    |                    | 0.029    | 0.014       |
| Hostellers                 | 119 (64.3)         | 66 (35.7)          |          |             |
| Non-hostellers             | 45 (54.2)          | 38 (45.8)          |          |             |
| Education background       |                    |                    | 0.096    | -           |
| A Level                    | 3 (42.9)           | 4 (57.1)           |          |             |
| Diploma                    | 5 (100.0)          | -                  |          |             |
| Foundation                 | 139 (60.4)         | 91 (39.6)          |          |             |
| STPM                       | 17 (65.4)          | 9 (34.6)           |          |             |

*Pearson Chi-Square; #Phi Cramer's V

4. DISCUSSION

The present study is the pioneer study conducted in Malaysian university that evaluates the perception of different health care students regarding ALS. The outcomes of the present study disclosed that a statistically significant difference was observed between response of question regarding the possible treatment of ALS by transplanting healthy glial cells into patients. A statistically significant difference ($p=0.049$) was observed between response of question 1 and age variable. The proportion of correct answer was more in the 20-25 years old as compared with the others. A weak positive association ($\phi=0.012$) was observed between faculty variable...
and response of the students. The reason behind could be the number of students in each category. The number of 20-25 years old students were more in the study as compared to the other age groups of students. The number of students is directly affecting the results of studies. The findings of current study are similar with the finding of a study conducted in Malaysia on root canal treatment in oral health, according to which the unmarried students had better knowledge as compared with the married students because of the difference in numbers in the cited study in Malaysia [12].

The findings of the current study showed that a statistically significant difference ($p=0.006$) was observed between response of question regarding the utilization of Riluzole as recommended in the management of ALS and faculty, year of education and residency variable. The correct answers were more in the faculty of medicine students (28.4%) as compared with the pharmacy and dental students. A weak positive association ($\phi=0.051$) was observed between faculty variable and response of the students. The reason behind could be that the adequate knowledge of faculty of medical students as compared with the other faculty's students regarding the utilization of Riluzole in ALS. The reason behind could be the better knowledge of medical students on the disease and this reason was in line with the previous studies too [13,14].

The outcome of the current study showed that a statistically significant difference was observed between response of question regarding the lower levels of vitamin D as higher risk of acquiring ALS with faculty ($p=0.003$) and residence ($p=0.029$) variable. The proportion of

| Variables | Wrong answer N (%) | Right answer N (%) | $P$ value* | Effect size |
|-----------|--------------------|--------------------|------------|-------------|
| Gender    |                    |                    | 0.452      | -           |
| Male      | 45 (52.9)          | 40 (47.1)          |            |             |
| Female    | 104 (56.8)         | 79 (43.2)          |            |             |
| Race      |                    |                    | 0.073      | -           |
| Malay     | 1 (50.0)           | 1 (50.0)           |            |             |
| Chinese   | 109 (57.4)         | 81 (42.6)          |            |             |
| Indian    | 38 (50.7)          | 37 (49.3)          |            |             |
| Others    | 1 (100.0)          | -                  |            |             |
| Faculty   |                    |                    | 0.002      | 0.069       |
| Medical   | 45 (54.2)          | 38 (45.8)          |            |             |
| Pharmacy  | 64 (64.0)          | 36 (36.0)          |            |             |
| Dental    | 40 (47.1)          | 45 (52.9)          |            |             |
| Age       |                    |                    | 0.065      | -           |
| 20-25     | 147 (56.1)         | 115 (43.9)         |            |             |
| 26-30     | 2 (40.0)           | 3 (60.0)           |            |             |
| More than 30 | -                | 1 (100.0)          |            |             |
| Year of Education | | | 0.136 | - |
| Year 3    | 55 (57.9)          | 40 (42.1)          |            |             |
| Year 4    | 69 (53.1)          | 61 (46.9)          |            |             |
| Year 5    | 25 (58.1)          | 18 (41.9)          |            |             |
| Residence |                    |                    | 0.018      | 0.029       |
| Hostellers| 106 (57.3)         | 79 (42.7)          |            |             |
| Non-hostellers | 43 (51.8) | 40 (48.2) |            |             |
| Education background | | | 0.088 | - |
| A Level   | 4 (57.1)           | 3 (42.9)           |            |             |
| Diploma   | 1 (20.0)           | 4 (80.0)           |            |             |
| Foundation| 130 (56.5)         | 100 (43.5)         |            |             |
| STPM      | 14 (53.8)          | 12 (46.2)          |            |             |

*Pearson Chi-Square; Φ Phi Cramer's V
Table 6. Perception of respondents to question 5

| Variables    | Wrong answer N (%) | Right answer N (%) | P value* | #Effect size |
|--------------|--------------------|-------------------|----------|--------------|
| **Gender**   |                    |                   |          |              |
| Male         | 18 (21.2)          | 67 (78.8)         | 0.139    | -            |
| Female       | 44 (24.0)          | 139 (76.0)        |          |              |
| **Race**     |                    |                   |          |              |
| Malay        | 1 (50.0)           | 1 (50.0)          | 0.063    | -            |
| Chinese      | 44 (23.2)          | 146 (76.8)        |          |              |
| Indian       | 17 (22.7)          | 58 (77.3)         |          |              |
| Others       | 0 (0.0)            | 1 (100.0)         |          |              |
| **Faculty**  |                    |                   |          |              |
| Medical      | 23 (27.7)          | 60 (72.3)         | <0.001   | 0.571        |
| Pharmacy     | 22 (22.0)          | 78 (78.0)         |          |              |
| Dental       | 17 (20.0)          | 68 (80.0)         |          |              |
| **Age**      |                    |                   |          |              |
| 20-25        | 60 (22.9)          | 202 (77.1)        | 0.057    | -            |
| 26-30        | 2 (40.0)           | 3 (60.0)          |          |              |
| More than 30 | -                  | 1 (100.0)         |          |              |
| **Year of Education** | |                   |          |              |
| Year 3       | 28 (29.5)          | 67 (70.5)         | 0.016    | 0.027        |
| Year 4       | 24 (18.5)          | 106 (81.5)        |          |              |
| Year 5       | 10 (23.3)          | 33 (76.7)         |          |              |
| **Residence**|                    |                   |          |              |
| Hostellers   | 44 (23.8)          | 141 (76.2)        | 0.518    | -            |
| Non-hostellers| 18 (21.7)         | 65 (78.3)         |          |              |
| **Education**|                    |                   |          |              |
| Background   | 4 (57.1)           | 3 (42.9)          | 0.093    | -            |
| A Level      | 1 (20.0)           | 4 (80.0)          |          |              |
| Diploma      | 50 (21.7)          | 180 (78.3)        |          |              |
| Foundation   | 7 (26.9)           | 19 (73.1)         |          |              |
| STPM         |                    |                   |          |              |

*Pearson Chi-Square; #Phi Cramer's V

correct answer was more in dental students as compared with the others. A weak positive association ($\phi=0.062$) was observed between faculty variable and response of the students. The results of present study regarding the lower levels of vitamin D as higher risk in ALS is similar with the study conducted in Malaysia according to which the pharmacy students had better knowledge about the disease [12].

The results of the current study presented that a statistically significant difference was observed between response of question 4 and faculty ($p=0.002$) and residence ($p=0.018$) variable. The proportion of correct answer was more in dental students as compared with the others. A weak positive association ($\phi=0.029$) was observed between residence variable and response of the students. Similarly, a statistically significant difference was observed between response of question 5 and faculty ($p=<0.001$) and year of education ($p=0.018$) variable. The proportion of correct answer was more in dental students as compared with the others. A moderate positive association ($\phi=0.571$) was observed between residence variable and response of the students. The results of present study regarding ALS are similar to the study conducted by Woelfel and colleagues according to which the female students had better knowledge about the disease as compared with the males [16].

5. CONCLUSION

The present study reported mixed findings regarding the perception of ALS among future healthcare providers in a private medical university. The medical faculty students had an appropriate perception about ALS whereas pharmacy students had better perception than the other students.

CONSENT AND ETHICAL APPROVAL

Before the enrolment of the participants, the informed consent form was signed from all the
respondents. The ethical approval of the study was taken from the university research and ethical committee. All the ethics, including the privacy of the data, was strictly followed as per the guidelines.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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