# Social Media Use and Hypertension Knowledge Among Undergraduate Students During the COVID-19 Pandemic in Faculty of Medicine and Health Sciences, Universiti Putra Malaysia 

Aneesa Abdul Rashid ${ }^{1}$, Navin Kumar Devaraj ${ }^{1}$, Low Zhi Xuan², Kasendra Selvanesan ${ }^{2}$, Akmal Aiman Noorazalan ${ }^{2}$<br>1 Department of Family Medicine, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Malaysia<br>2 Second Year Medical Student of Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Malaysia


#### Abstract

Introduction: : Malaysian hypertension prevalence is high at $30 \%$ and is the highest risk factor for mortality. Good hypertension knowledge suggests a favourable outcome. Online sources are a popular method of obtaining information especially in young adults and during the pandemic. Our objective is to determine health information seeking online, use of social media, and hypertension knowledge among undergraduate students. Methods: This is a cross-sectional study conducted in the Faculty of Medicine and Health Sciences (FHMS), Universiti Putra Malaysia (UPM). Random sampling was done. An online questionnaire with four sections: (1) socio-demographic data; (2) use of social media; (3) health information sought online; and (4) hypertension knowledge was used. Data were analysed using the SPSS version 25 using Independent T tests and one-way ANOVA to identify factors associated with hypertension knowledge. Results: Mean (SD) age of 286 respondents was 21(1.2) years. Most respondents were female, 207(73.1\%), Malays, 177(61.9\%) and taking the Medicine course 127(44.4) with a mean of 9.50(4.50) hours of internet usage daily. Many respondents 196(68.5\%) looked for information on hypertension online. The mean score for hypertension knowledge was 8.32(1.46); classified as good knowledge. Hypertension knowledge was significantly associated with race ( $p<0.001$ ), type of course ( $p<0.001$ ), year of study ( $p<0.001$ ) and type of health information searched online ( $\mathrm{p}=0.010$ ). Conclusion: We found significant better knowledge in Indians compared to Malays, medical students compared to biomedical sciences and occupational health, students in year 5 compared to years $1 \& 2$. Participants that searched on hypertension online had better knowledge on hypertension. Malaysian Journal of Medicine and Health Sciences (2022) 18(14)1-9. doi:10.47836/mjmhs18.s14.1


Keywords: Hypertension; Social Media use; Online health information seeking; Undergraduate students

## Corresponding Author:

Aneesa Abdul Rashid, DrFamMed
Email: aneesa@upm.edu.my
Tel: +603-9769 2956

## INTRODUCTION

Hypertension is a major public health problem worldwide. The World Health Organization (WHO) estimates 1.13 billion people worldwide have hypertension (1). It causes cardiovascular diseases, chronic kidney disease, and premature mortality if diagnosis and management is delayed (2). Thirty percent of Malaysian adults aged 18 and above is reported to
be hypertensive (3). Hypertension is a serious disorder that continues to progress in young adults (4). It has been estimated that about $17 \%$ of the population that are young adults aged between 18-39 years have hypertension (5). This result reflects the magnitude of the problem even in the younger population whereby prevalence of hypertension and prehypertension are around $13-17 \%$ in a local study conducted at 12 high schools (6). These groups of people are arguably the group that are most capable of making lifestyle changes in order to prevent or control the condition (7). There are many challenges faced when treating young adults for hypertension, among them the perception of being 'old' as they need to start taking medications, lack of
health education and also lack of suitable educational materials and health resources $(8,9)$.

Poor knowledge on hypertension has been shown to be linked with a poor control of hypertension (10). Hence efforts should be made to increase knowledge on hypertension in order to obtain better outcomes (11). Researchers have called upon more efforts to increase hypertension knowledge among the community (8,1214).

Grad I. et al study based in Poland report 49.2\% of adolescents scored "low" for knowledge on hypertension (13). However, in Malaysia, a study done in the developed state of Selangor reported the knowledge to be positively correlated to age, meaning the older the person, the higher the knowledge level on hypertension (15). This gives a good argument to target the younger population in terms of knowledge on hypertension.

The World Health Organization (WHO) states that eHealth has become a priority as it is cost effective and because of eHealth's ability to increase the level of knowledge in health related fields in the community (16). A study done among university students in Ghana reports that many of them have access to the internet. It was reported that $68 \%$ of the participants in this study use the internet to get information and support on health (17). This is much lower than the rates reported in another study from the same country that involved the patients themselves, in which one third of the participants were below 30 years old (18). This shows the preference of young adults in the university setting that are more inclined to an online health information seeking. Furthermore, due to the COVID-19 pandemic, online teaching has been the only alternative as a measure to prevent the disease spread (19). However, there are limited studies specifically on hypertension knowledge in Malaysia and its association with use of social media and health information seeking practices online.

The internet is often used as a platform to connect socially with other people; this has proven to be a very popular choice of internet usage in many countries, including in Malaysia (20). Social media has been described as having a promising role in health interventions due to its vast number of users and its promising impact on behavioural change (21). During the COVID-19 pandemic, this has been discussed as powerful tool for health information dissemination $(22,23)$. Because social networking on its own has proven to give a positive impact on hypertension education, the same may therefore be postulated for the social media (24).

Knowledge on hypertension is relatively important in the effort to prevent and achieve the control of hypertension, while creating awareness among the public at the same time. Online health information
seeking practices and use of social media are essential tools and preferred forms of information sourcing among young adults, particularly those currently pursuing their higher education. It is beneficial to have this overview, especially those who will be the future health front liners. It can provide valuable data to help in decreasing the hypertension disease burden.

This study was done amongst the students in Faculty of Medicine and Health Sciences (FMHS), Universiti Putra Malaysia (UPM) because this population represents the young adult generation that should be aware of healthcare-related-knowledge and may be a good start to plan an awareness program on hypertension, and perhaps later to initiate programs targeted to increase the hypertension knowledge among the students.

## MATERIALS AND METHODS

## Study design

A cross-sectional questionnaire study was carried out among undergraduate students in the FHMS, UPM . The objective of this study is to determine health information seeking online, use of social media, and hypertension knowledge among undergraduate students. The hypertension related questions were used to assess the association between the information of respondents' socio-demographic aspects, usage of social media and online health information seeking practices with hypertension knowledge level among the respondents.

## Study Setting

Respondents were recruited during 24th August 2020 until 9th October 2020 from undergraduate students in the FMHS. The study population consisted of both male and female with age ranging from 20-25. The inclusion criteria included all the undergraduate students in FMHS while exclusion criteria for students on long leave, acutely unwell students and those that dropped out of the course.

## Sample Size

We used the formula to estimate two sample proportions by Lwanga S.K. and Lemeshow $S(25)$ :
$\mathrm{n}=\left\{\left[\mathrm{Z}_{(1-\alpha / 2)} *\left(\sqrt{ } 2 P(1-P)+\left[\mathrm{Z}_{(1-)} *\left(\sqrt{ } P_{1}\left(1-P_{1}\right)+P_{2}\left(1-P_{2}\right)\right]\right\}^{2} /\right.\right.\right.$ $\left(P_{1}-P_{2}\right)^{2}$

Based on research by Shaikh et al in 2011(26) reporting the proportion of good knowledge of hypertension according to gender.
P1 = proportion of males with good knowledge of hypertension $=0.731, \mathrm{P} 2=$ proportion of females with good knowledge of hypertension $=0.56$. The sample size obtained was 286 including $20 \%$ attrition rate.

## Sampling Method

A simple random sampling was used to choose 286 from 1370 undergraduate students. List of courses and years of all undergraduate students was obtained from the

Academic Unit of the university in the semester 20192020. A response rate of $100 \%$ was recorded. All the undergraduate students were given a number according to the list obtained from the faculty. Thus, 286 numbers ranging from 1-1370 were chosen randomly using a number generator and the student to each number specifically was chosen. The online questionnaire was delivered to the chosen students' email through a student-based email platform. Questionnaire used are in supplementary file 1.

## Data Collection

Each student was invited in person through email via an email database after class to fill an online selfadministered questionnaire. A reminder was sent again to those who had not filled in every 2 days until they completed filling in the form. The students were informed through the form in person that participation was voluntary, and they had the right to refuse to participate. A consent form was requested to be signed before the respondents started to answer the questionnaire questions.

## Study Instrument

Questionnaires from past published studies were used as the study instruments. They assessed the "health information seeking and social media use" was adapted from a research about social media usage and internet health information seeking in diabetic patients (21). The knowledge on hypertension questionnaire was adapted from another study that used a tool developed to assess knowledge among urban patients (27).

These questionnaires were in the English language and divided into four parts:

## 1. Socio-demographic factors

Questions were asked on the students' age, gender, year of study, ethnicity, undergraduate courses, family monthly income and length of internet use. There were a total of 8 questions.

## 2. Social media use questionnaire

The respondents were assessed the type of social media use and rate the duration of different types of social media used with 11 questions. The respondents were allowed to choose if they use social media daily or number of times a week, they used the social media. The respondents were also allowed to state their average hours per day of using social media.
3. Online health information seeking

The respondents were assessed the type of health information sought online specifically on hypertension was asked initially and followed by any other health information. The respondents could choose their favourable platform for online health information seeking. There was a total of 2 questions in this section.
4. Knowledge of hypertension

The hypertension related questions allowed for the respondents to choose one of the answers from the 10 multiple choice questions that had only one correct
answer for each question. The responses for the knowledge of hypertension were coded as correct with 1 point awarded, as for incorrect or don't know 0 points was awarded. The summed total score ranged from $0-10$. Respondents who scored 0-7 were classified as having low hypertension knowledge, 8 correct answers as having moderate hypertension knowledge and 9-10 as having high hypertension knowledge (27).

The validity was done prior to finalising the questionnaire. Content validation was done with an expert panel of one Public Health and three Family Medicine specialists. Feedback post validation was addressed before finalising the questionnaire. For face validation, questionnaires were given out to $10 \%$ of students. All questions were answered without any missing answers and no queries from the 30 students. The reliability test was done by using Cronbach's Alpha. The Cronbach's Alpha was used to measure the internal consistency. The result from Cronbach's Alpha for total scoring of hypertension knowledge was high (0.719).

## Data Analysis

The data was analysed using IBM SPSS version 25.0. Analyses of the socio-demographic aspects were shown by descriptive statistics via frequency, percentage, mean and standard deviation. The analytic statistics for mean score of hypertension knowledge was calculated using the Independent T test. Meanwhile, the continuous data for variables with more than two categories analysed using one-way ANOVA. The significance level was set at $p<0.05$. Normally distributed continuous data was presented by mean and standard deviation.

## Ethical consideration

Ethical permission for the study (JKEUPM-2020-209) was issued by the Ethics Committee for Study involving Human subjects of Universiti Putra Malaysia (JKEUPM). The students were informed through the form in person that participation was voluntary, and they had the right to refuse to participate. A consent form was requested to be signed before the respondents started to answer the questionnaire questions.

## RESULT

## Socio-demographic Characteristics

Table I shows the socio-demographic characteristics of the respondents by age, gender, race, undergraduate courses, year of study, family income status, duration of using the internet in life and average hours of using the internet in a day. The mean age of the respondents was 21 ( $\mathrm{SD}=1.204$ ). There were more respondents from the female participants ( $73.1 \%$ ) and those pursuing Medicine course ( $44.4 \%$ ). Other courses were environmental and occupational health ( $17.1 \%$ ), biomedical sciences ( $16.4 \%$ ), Bachelor of nursing ( $8.4 \%$ ), nutrition and community health ( $7.3 \%$ ) and dietetic course ( $6.3 \%$ ). Majority of the participants were Malays (61.9\%),
followed by Chinese (19.2\%), Indian (15.4\%) and others ( $3.5 \%$ ). In terms of year of study, $38.8 \%$ of the respondents were from year 2 and majority had between RM2000-RM5000 in terms of family income (35.0\%). The mean hours of the respondents using the internet per day was 9.50 hours ( $\mathrm{SD}=4.504$ ).
Social Media Use Among Respondents
Table I: Socio-demographic Characteristics of Study Respondents ( $\mathrm{N}=286$ )
$\left.\begin{array}{llll}\hline \text { Variable } & \begin{array}{l}\text { Mean } \\ \text { (SD) }\end{array} & \begin{array}{l}\text { Fre- } \\ \text { quen- } \\ \text { Cy }\end{array} & \text { \% } \\ & & \text { (N) }\end{array}\right]$

Most of the respondents used WhatsApp (39.5\%), followed by Instagram (30.8\%); Twitter (15.4\%); Facebook ( $7.3 \%$ ) and $7.0 \%$ used other social media. Our study had shown that most of the respondents used social media daily with social networking sites (90.2\%); YouTube (59.4\%) and Instagram (78.0\%). Others used social media for 5-6 days per week, 2-4 days per week and 1 or $<1$ day per week. There were two social media that unexpectedly had lower usage by respondents which involved nearly half of the participants which were Facebook (49.3\%) and online blogs (50\%) that used this media 1 or $<1$ per week.

Online Health Information Seeking Among Respondents More than two third (68.5\%) of the respondents searched online about hypertension, more than onequarter (28.3\%) did not search on health information while only $3.2 \%$ of them searched for other health information. Regarding the hypertension information obtained from the internet, the majority ( $93.7 \%$ ) of the respondents searched for general information, more than two third ( $70.6 \%$ ) searched for treatment options while $1.4 \%$ did not search for hypertension information. Regarding other health information searched online, the majority ( $78.0 \%$ ) of the respondents searched for general information while $4.9 \%$ did not search for any other health information. Others also searched for treatment options, ways to cope, alternative or complementary, nutrition, journal articles, chat room, discussion group or online support group and financial assistance.

## Knowledge of Hypertension

Table II shows the responses towards questions on the knowledge on hypertension among study respondents. The mean knowledge of hypertension among respondents reported 8.23 which were classified as having a high level of knowledge; where $74.1 \%$ of the respondents reported high knowledge and $25.9 \%$ were reported as having a low level of knowledge.

Table II: Responses of Study Respondents to the Questions on Knowledge of Hypertension ( $\mathrm{N}=286$ )

| Questions |  | Correct |  | Incorrect |  |
| :--- | :--- | :---: | :---: | :---: | :---: |
|  | $\mathbf{N}$ | $\mathbf{n}$ <br> $(\%)$ | $\mathbf{N}$ | $\mathbf{n}$ <br> $(\%)$ |  |
| Blood pressure of $125 / 84 \mathrm{mmHg}$ <br> high, low or normal. | 230 | 80.4 | 56 | 19.6 |  |
| Blood pressure of $160 / 100$ <br> mm Hg is high, low or | 274 | 95.8 | 12 | 4.2 |  |
| normal |  |  |  |  |  |

Table II: Responses of Study Respondents to the Questions on Knowledge of Hypertension ( $\mathrm{N}=286$ )(CONT.)

| Questions |  | Correct |  | Incorrect |  |
| :--- | :---: | :---: | :---: | :---: | :---: |
|  | $\mathbf{N}$ | $\mathbf{n}$ <br> $(\%)$ | $\mathbf{N}$ | $\mathbf{n}$ <br> $(\%)$ |  |
| Losing weight can make the blood <br> pressure go up, go down, stay the <br> same or don't know. | 200 | 69.9 | 86 | 30.1 |  |
| Eating less salt can make the <br> blood pressure go up, go down, <br> stay the same or don't know. | 258 | 90.2 | 28 | 9.8 |  |
| High blood pressure can cause <br> heart attacks | 281 | 98.3 | 5 | 1.7 |  |
| High blood pressure can cause <br> cancer. | 198 | 69.2 | 88 | 30.8 |  |
| High blood pressure can <br> cause kidney damage. | 239 | 83.6 | 47 | 16.4 |  |
| High blood pressure can cause <br> strokes. | 274 | 95.8 | 12 | 4.2 |  |

Factors associated with the knowledge of hypertension Table III shows socio-demographic characteristics associated with the knowledge of hypertension scores. This study reported a significant correlation between race ( $p<0,001$ ), undergraduate study ( $p<0.001$ ) and year of study ( $\mathrm{p}<0.001$ ) with the knowledge of hypertension. Other socio-demographic characteristics were found not to be related to the knowledge on hypertension.
In terms of race, Post Hoc test revealed a significant difference between mean knowledge of Malays and Indians ( $p=0.004$ ). Post Hoc test for undergraduate courses showed that there is a significant difference between mean knowledge of Medicine and Biomedical science courses ( $p=0.010$ ); Medicine and Environmental and occupational health courses ( $\mathrm{p}<0.001$ ) as well as between Nursing and Environmental and occupational health courses ( $p=0.016$ ). Meanwhile, for the year of study, significant differences were found between the mean knowledge of years of study; year 1 and year 5 ( $\mathrm{p}=0.017$ ); year 2 and year $3(\mathrm{p}=0.036)$ and year 2 and year $5(p=0.001)$.

Table III: Association between Socio-demographic Characteristics with the knowledge of hypertension

| Variables | Mean <br>  <br>  <br>  <br>  <br> Knowledge of <br> hypertension <br> (SD) | Total | Ttest |  |
| :--- | :---: | :---: | :---: | :---: |
|  |  | $\mathbf{n ( \% )}$ | tvalue | $\boldsymbol{p}$-value |
| Age |  | -1.157 | 0.248 |  |
| $<21$ years old | $8.07(1.303)$ | $82(28.7)$ |  |  |
| $\geq 21$ years old | $8.29(1.519)$ | $204(71.3)$ |  |  |
| Gender |  |  | 0.842 | 0.401 |
| Male | $8.35(1.707)$ | $77(26.9)$ |  |  |
| Female | $8.19(1.362)$ | $209(73.1)$ |  |  |

CONTINUE

Table III: Association between Socio-demographic Characteristics with the knowledge of hypertension (CONT.)

| Variables | Mean Knowledge of hypertension (SD) | Totaln (\%) | T-test |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | t-value | $p$-value |
| Average hours of using the internet per day |  |  | 1.059 | 0.291 |
| < 10 hours | 8.32 (1.365) | 147 (51.4) |  |  |
| $\geq 10$ hours | 8.14 (1.557) | 139 (48.6) |  |  |
|  |  |  | One Way ANOVA |  |
|  |  |  | $\underset{\text { value }}{\underline{F}}$ | p-value |
| Race* |  |  | 5.960 | <0.001 |
| Malay | 7.98 (1.537) | 177 (61.9) |  |  |
| Chinese | 8.58 (1.166) | 55 (19.2) |  |  |
| Indian | 8.86 (1.250) | 44 (15.4) |  |  |
| Others | 8.00 (1.333) | 10 (3.5) |  |  |
| Undergraduate Course* |  |  | 10.023 | <0.001 |
| -Medicine | 8.74 (1.311) | 127 (44.4) |  |  |
| -Biomedical science | 7.83 (1.388) | 47 (16.4) |  |  |
| -Environmental and occupational health (OSHA) | 7.22 (1.545) | 49 (17.1) |  |  |
| -Dietetic | 8.06 (1.392) | 18 (6.3) |  |  |
| -Nutrition and community health | 8.24 (1.044) | 21 (7.3) |  |  |
| -Bachelor of nursing | 8.50 (1.351) | 24 (8.4) |  |  |
| Year of study* |  |  | 6.979 | $<0.001$ |
| 1 | 8.08 (1.286) | 72 (25.2) |  |  |
| 2 | 7.85 (1.376) | 111(38.8) |  |  |
| 3 | 8.56 (1.388) | 62 (21.7) |  |  |
| 4 | 8.75 (2.152) | 24 (8.4) |  |  |
| 5 | 9.41 (0.870) | 17 (5.9) |  |  |
| Family income status |  |  | 0.143 | 0.934 |
| < 2000 | 8.17 (1.264) | 60 (21.0) |  |  |
| 2000-5000 | 8.23 (1.752) | 100 (35.0) |  |  |
| 5000-10000 | 8.32 (1.061) | 76 (26.6) |  |  |
| >10000 | 8.18 (1.600) | 50 (17.5) |  |  |

## Social media usage associated with the knowledge of hypertension

We found no associations between the use of social media associated with the knowledge of hypertension among the undergraduate students

## Health information seeking online associated with hypertension knowledge

Table IV shows health information seeking online practices that are associated with the hypertension knowledge scores. There was an association between the type of health information search online and the hypertension knowledge score ( $p=0.010$ ). A significant difference was found between searching online about hypertension and not searching for any other type of health information. However, there is no association between the hypertension knowledge searched online and the mean knowledge of hypertension.

Table IV : Association between Social Media Usage with the Knowledge of Hypertension

| Variables | Mean knowledge of Hypertension | Total | One Way ANOVA |
| :---: | :---: | :---: | :---: |
|  |  | n (\%) | $p$-value |
| Online social media used most often |  |  | 0.250 |
| Facebook | 8.81 (1.209) | 21 (7.3) |  |
| Instagram | 8.17 (1.606) | 88 (30.8) |  |
| WhatsApp | 8.27 (1.525) | 113(39.5) |  |
| Twitter | 8.16 (1.055) | 44 (15.4) |  |
| Others | 7.80 (1.361) | 20 (7.0) |  |
| Visit online social networking sites |  |  | 0.368 |
| Daily | 8.22 (1.454) | 258(90.2) |  |
| 5-6 Days per week | 8.33 (1.759) | 15 (5.2) |  |
| 2-4 Days per week | 7.57 (1.397) | 7 (2.4) |  |
| 1 or $<1$ day per week | 9.00 (0.894) | 6 (2.1) |  |
| Read online blogs |  |  | 0.417 |
| Daily | 8.26 (1.621) | 47 (16.4) |  |
| 5-6 Days per week | 7.79 (1.686) | 19 (6.6) |  |
| 2-4 Days per week | 8.13 (1.399) | 77 (26.9) |  |
| 1 or $<1$ day per week | 8.34 (1.409) | 143(50.0) |  |
| Watch Youtube |  |  | 0.479 |
| Daily | 8.29 (1.344) | 170(59.4) |  |
| 5-6 Days per week | 7.96 (1.702) | 50 (17.5) |  |
| 2-4 Days per week | 8.24 (1.633) | 55 (19.2) |  |
| 1 or $<1$ day per week | 8.55 (1.293) | 11 (3.8) |  |

Table IV : Association between Social Media Usage with the Knowledge of Hypertension (CONT.)

| Variables | Mean knowledge of Hypertension (SD) | Total | One Way ANOVA |
| :---: | :---: | :---: | :---: |
|  |  | n (\%) | $p$-value |
| Use Facebook |  |  | 0.233 |
| Daily | 8.50 (1.565) | 82 (28.7) |  |
| 5-6 Days per week | 8.04 (1.556) | 27 (9.4) |  |
| 2-4 Days per week | 8.25 (1.317) | 36 (12.6) |  |
| 1 or $<1$ day per week | 8.11 (1.408) | 141(49.3) |  |
| Use Instagram |  |  | 0.176 |
| Daily | 8.21 (1.443) | 223(78.0) |  |
| 5-6 Days per week | 8.17 (1.736) | 24 (8.4) |  |
| 2-4 Days per week | 7.80 (1.568) | 15 (5.2) |  |
| 1 or $<1$ day per week | 8.79 (1.179) | 24 (8.4) |  |

This study investigates young adults particularly those in the medical health science field at a public university on their level of knowledge on hypertension, and their social media use. In terms of social media use in this study population, the most popular form of social media platform is WhatsApp and Instagram. A recent published study done in the US among medical students on learning the subject obstetrics and gynaecology online found that there were several positive points to Instagram. These are due to the presence of other medical Instagram accounts, gaining new followers easily, the application itself encourages engagement with users, and its simple concept of posting content (28). Facebook on the other hand was said to have limited reach to new followers and its algorithm is said to make it less reachable to followers (28).

In terms of race, this study had shown a significant association with knowledge of hypertension. We found those from the Indian ethnicity to have higher scores compared to the Malays. Although Malays had more respondents, at just above $60 \%$, the mean knowledge was the lowest. This might be due to the percentage of Indian students among year 5 respondents being higher than other years' respondents. One study concludes that Indians have been said to have a positive attitude towards learning the English language when on Facebook one reason being due to many of them were highly motivated to use English in both offline and online environments (29). Since a lot of information online is in English, this may be the reason for the higher knowledge portrayed among the Indian students.

For the undergraduate courses, this study reports a significant association with the knowledge of hypertension. The student taking up medicine course scored more knowledge than students taking up other courses, while Nursing students scored higher in the knowledge questions compared to students taking up the Environmental and Occupational health courses. A study done in the UAE among entry students at a medical university also states that medical students had a higher proportion of good knowledge compared to those taking other health sciences courses (26). This study had also shown a significant association between years of study and knowledge of hypertension, where year 5 had the highest level of knowledge compared to other years. Both year of study and course undertaken by students is expected to contribute to a higher knowledge in hypertension.

This study reports no association between age with the knowledge of hypertension. This was in contrast to another Malaysian study on the knowledge, attitude and practices of hypertension that stated that a significant positive correlation between age and knowledge scores (15). Another study in Iran, reports that the younger age group (30-39) had higher knowledge than those above 60 years old (30). The results of this study may yield different results compared to the Iranian study due to the age group of the previously mentioned two studies that involved an older age group that are more likely to have hypertension for a longer period. In terms of comparison with the same age group, a study done in United Arabs Emirates (UAE) (26) reciprocated our findings of no significant association between age and knowledge, which is not surprising considering the small age differences, as compared to studies with a wider age group.

We also report no association between gender and knowledge of hypertension, which were the same as reported by a study done among adolescence aged 16-19 in Poland (13). This is different from another study done among entry year students in a UAE medical university that reported males having a higher percentage of having good knowledge on hypertension compared to females (26). However, in this study females made up $76.4 \%$ of the study participants, which may give a less accurate result in terms of gender.

There was no association between family income status and mean hours of using the internet per day with knowledge of hypertension which was also reflected in a Turkish study done among patients with hypertension (31). There is however very limited published research done on the association between family income status with knowledge of hypertension. Nevertheless, research done in China looking into income status with awareness of hypertension stated that individuals with low income were more likely to have bad awareness and risky behaviour (32).

The result of this study also showed that there was no association between the use of social media with the knowledge of hypertension. To date, there are limited published studies done to investigate the associations between social media usage with the knowledge of hypertension. Nonetheless, a study looking into social media connections and network-based services states both factors could encourage hypertension treatment as they require considerable daily efforts (33). This might show that there was a significant usage of social media for hypertension treatment in the future. Another study looking into use of hypertension related Facebook content found that a majority were there to raise awareness on the disease but these platforms were small and inactive compared to other platforms in Facebook (34).

We did not find any significant association between social media use and knowledge on hypertension. Although systematic reviews have reported social media as a good communication tool assisting target users on a variety of health-related conditions, however studies looked into a targeted groups with specific interventions which was not the case in this research project (35-37). We also found no significant association between hypertension information and other health related information obtained from the internet with the knowledge of hypertension were reported. This may be because we did not delve deeper on how the information was obtained, online sources of medical information, types of popular websites and how it was chosen. A recently published study discussed on this issue and students reported that the problems faced with online health information is assessing its reliability, if the information had a commercial motivation, and problems in finding the exact information they are looking for (38). Based on this study, the result showed that there was a significant association between the types of health information searched online and the hypertension knowledge score; those who sought online information on hypertension scored higher compared to those who searched other types of health information or "none". This may indicate that students who sought information online on hypertension, investigated proper sources and therefore level of knowledge is better compared to those who didn't. This is important to note because, there are other concerns with regards online activities linked to the spread of inaccurate, unregulated and harmful information, privacy issues, besides the exposure to harmful behaviours for example cyberbullying $(35,36)$. However, looking into the background of the students, this comes as no surprise albeit as a good sign.

## Limitations

This is cross sectional study, therefore, can't demonstrate causality. It is done in only one centre and not representative of the whole undergraduate medical sciences student population. We also did not control
for prior knowledge (including whether the medical students had already covered the topic in their courses), and the restriction to a small number of medical students along with uneven distribution across the year of study, limits the strength and generalisability of the findings.

## CONCLUSION

This study reports good knowledge on hypertension among undergraduate medical health sciences students. Those who were of Indian ethnicity, took the Medicine (MD) course, in 5th year of study and searched information on hypertension online, and had significantly higher hypertension knowledge scores. Hence health awareness can be increased via the help of online websites, a medium to spread information to the public. This study serves as a platform to create awareness of the importance of online health information seeking and more social media platforms should be used to spread health related information, especially during situations like a pandemic. We feel it is important to evaluate knowledge of a non-communicable disease as common as hypertension that may be affected by online health information seeking practices. It is important to note that the use of online teaching has become popular as a method to combat spread during the COVID-19 pandemic.

## ACKNOWLEDGEMENTS

We would like to thank the students of FMHS (UPM) for their contribution as study participants. We also thank the Dean for his support of this study.

## REFERENCES

1. World Health Organisation. Hypertension [Internet]. Hypertension. 2019 [cited 2020 Jul 2]. Available from: https://www.who.int/news-room/ fact-sheets/detail/hypertension
2. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). JAMA. 2014 Feb 5;311(5):50720.
3. National Health and Morbidity Survey 2019 [Internet]. The Malaysian Paediatric Association. 2020 [cited 2020 Jul 2]. Available from: https:// mpaeds.my/national-health-and-morbidity-survey-2019/
4. Ryan J S, Johnson CM. Health Information Seeking and Social Media Use on the Internet among People with Diabetes. Online J Public Health Inform. 11AD;3(1):1-9.
5. Omar MA, Irfan NI, Yi KY, Muksan N, Majid NLA, Yusoff MFM. Prevalence of Young Adult Hypertension In Malaysia And Its Associated

Factors: Findings From National Health And Morbidity Survey 2011. Prim Educ. 2016;16:7.
6. Rampal L, Ng K, Izzati IN, Izzati ZF, Nazrul IM, Faisal I, et al. Prevalence of Hypertension Among Malay Adolescents in Putrajaya Secondary Schools, Malaysia, 2010. 2011;7:8.
7. Tomlinson P. An Initiative to Educate and Support Young Adults Diagnosed with Hypertension. Coll Nurs Health Sci Dr Nurs Pract DNP Proj Publ [Internet]. 2020 Jan 1; Available from: https:// scholarworks.uvm.edu/cnhsdnp/41
8. Johnson HM, Warner RC, LaMantia JN, Bowers BJ. "I have to live like I'm old." Young adults' perspectives on managing hypertension: a multicenter qualitative study. BMC Fam Pract. 2016 Dec;17(1):31.
9. Johnson HM, Olson AG, LaMantia JN, Kind AJH, Pandhi N, Mendonsa EA, et al. Documented Lifestyle Education Among Young Adults with Incident Hypertension. J Gen Intern Med. 2015 May;30(5):556-64.
10. Almas A, Godil SS, Lalani S, Samani ZA, Khan AH. Good knowledge about hypertension is linked to better control of hypertension; A multicentre cross sectional study in Karachi, Pakistan. BMC Res Notes. 2012 Oct 24;5(1):579.
11. Saleem F, Hassali MA, Shafie AA, Haq NU, Farooqui M, Aljadhay H , et al. Pharmacist intervention in improving hypertension-related knowledge, treatment medication adherence and healthrelated quality of life: a non-clinical randomized controlled trial. Health Expect. 2015;18(5):127081.
12. Rahman ARA, Rashid AA. Hypertension; East and West. J Cardiol Curr Res. 2017;10(1):353.
13. Grad I, Mastalerz-Migas A, Kiliś-Pstrusińska K. Factors associated with knowledge of hypertension among adolescents: implications for preventive education programs in primary care. BMC Public Health. 2015 May 3;15(1):463.
14. Oliveria SA, Chen RS, McCarthy BD, Davis CC, Hill MN. Hypertension Knowledge, Awareness, and Attitudes in a Hypertensive Population. J Gen Intern Med. 2005;20(3):219-25.
15. Buang NFB, Rahman NAA, Haque M. Knowledge, attitude and practice regarding hypertension among residents in a housing area in Selangor, Malaysia. Med Pharm Rep. 2019 Apr;92(2):145-52.
16. World Health Organization. Global Diffusion of E-health: making universal health coverage achievable. Geneva, Switzerland: World Health Organization; 2017.
17. Osei Asibey B, Agyemang S, Boakye Dankwah A. The Internet Use for Health Information Seeking among Ghanaian University Students: A CrossSectional Study [Internet]. Vol. 2017, International Journal of Telemedicine and Applications. Hindawi; 2017 [cited 2020 Jul 7]. p. e1756473. Available from: https://www.hindawi.com/
journals/ijta/2017/1756473/
18. Nangsangna RD, da-Costa Vroom F. Factors influencing online health information seeking behaviour among patients in Kwahu West Municipal, Nkawkaw, Ghana. Online J Public Health Inform [Internet]. 2019 Sep 19 [cited 2020 Jul 7];11(2). Available from: https://www.ncbi.nlm. nih.gov/pmc/articles/PMC6788904/
19. Rashid AA, Rashid MRA, Yaman MN, Mohamad I. Teaching Medicine Online During the COVID-19 Pandemic: A Malaysian Perspective. Bangladesh J Med Sci [Internet]. 2020 Jul 20 [cited 2020 Jul 22]; Available from: https://www.banglajol.info/index. php/BJMS/article/view/48170
20. Internet Users Survey I Malaysian Communications and Multimedia Commission (MCMC) [Internet]. Malaysian Communications and Multimedia Commission (MCMC) I Suruhanjaya Komunikasi dan Multimedia Malaysia (SKMM). 2018 [cited 2020 Jan 18]. Available from: https://www.mcmc. gov.my/en/resources/statistics/internet-userssurvey
21. Shaw RJ, Johnson CM. Health Information Seeking and Social Media Use on the Internet among People with Diabetes. Online J Public Health Inform [Internet]. 2011 Jun 22 [cited 2020 Jul 7];3(1). Available from: https://www.ncbi.nlm.nih. gov/pmc/articles/PMC3615779/
22. Rashid AA, Kamarulzaman A, Sulong S, Abdullah S. The role of social media in primary care. Malays Fam Physician. 2021 Jun;16(2):5.
23. Rashid A A, Mohamad I, Mohd Haris A F. The Role of Social Media in Making an Impact to Health Knowledge and Behaviour on COVID-19 in Malaysia. Univ Sains Malays. 2021 Jun;28(3):1557.
24. Shaya FT, Chirikov VV, Mullins CD, Shematek J, Howard D, Foster C, et al. Social Networks Help Control Hypertension. J Clin Hypertens Greenwich Conn. 2013 Jan;15(1):34-40.
25. Lwanga S, Lemeshow S. Sample size determination in health studies: A practical manual, 1991. World Health Organ Geneva. 1991;88.
26. ShaikhR,MathewE,SreedharanJ,Muttappallymyalil J, Al Sharbatti S, Basha S. Knowledge regarding risk factors of hypertension among entry year students of a medical university. J Fam Community Med. 2011;18(3):124.
27. Sanne S, Muntner P, Kawasaki L, Hyre A, DeSalvo K. Hypetrension Knowledge Among Patients from an Urban Clinic. Etnicity Dis. 2008;18:42-7.
28. Carman KL, Minns A, Garber S, Hammoud MM, Hortsch M. ObGyn Delivered: Social Media Serving Medical Students' Learning Needs. Med Sci Educ. 2021 Apr;31(2):827-36.
29. Adi Kasuma SA. USING FACEBOOK FOR ENGLISH

LANGUAGE LEARNING: THE DIFFERENCES AMONG GENDER AND ETHNICITY. J Nusant Stud JONUS. 2017 Jun 30;2(1):177.
30. Zinat Motlagh SF, Chaman R, Ghafari SR, Parisay Z, Golabi MR, Eslami AA, et al. Knowledge, Treatment, Control, and Risk Factors for Hypertension among Adults in Southern Iran. Int J Hypertens. 2015;2015:1-8.
31. Kilic M. The effect of knowledge about hypertension on the control of high blood pressure. Int J Cardiovasc Acad. 2016;7.
32. Zhang W, Meng H, Yang S, Luo H, Liu D. Changes in Hypertension-Related Knowledge and Behavior and Their Associations with Socioeconomic Status among Recently Urbanized Residents in China: 2013-2016. Int J Environ Res Public Health [Internet]. 2018 Aug [cited 2021 Mar 24];15(8). Available from: https://www.ncbi.nlm.nih.gov/ pmc/articles/PMC6121690/
33. Cornwell EY, Waite LJ. Social Network Resources and Management of Hypertension. J Health Soc Behav. 2012 Jun 1;53(2):215-31.
34. Al Mamun M, Ibrahim HM, Turin TC. Social Media in Communicating Health Information: An Analysis of Facebook Groups Related to Hypertension. Prev Chronic Dis. 2015 Jan 29;12:140265.
35. Moorhead SA, Hazlett DE, Harrison L, Carroll JK, Irwin A, Hoving C. A New Dimension of Health Care: Systematic Review of the Uses, Benefits, and Limitations of Social Media for Health Communication. J Med Internet Res. 2013;15(4):e85.
36. Giustini D, Ali SM, Fraser M, Kamel Boulos MN. Effective uses of social media in public health and medicine: a systematic review of systematic reviews. Online J Public Health Inform [Internet]. 2018 Sep 21 [cited 2021 Jan 6];10(2). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC6194097/
37. Laranjo L, Arguel A, Neves AL, Gallagher AM, Kaplan R, Mortimer $N$, et al. The influence of social networking sites on health behavior change: a systematic review and meta-analysis. J Am Med Inform Assoc. 2015 Jan;22(1):243-56.
38. Dadaczynski K, Okan O, Messer M, Leung AYM, Rosбrio R, Darlington E, et al. Digital Health Literacy and Web-Based Information-Seeking Behaviors of University Students in Germany During the COVID-19 Pandemic: Cross-sectional Survey Study. J Med Internet Res. 2021 Jan 15;23(1):e24097.

