



# COVID-19 knowledge, attitude and practice among medical undergraduate students in Baghdad City

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## Abstract

**Background:** Exceptional procedures have been adopted by many countries to stem ongoing spread of the COVID-19 pandemic. The individuals' adherence for the preventive and control measures are largely influenced by their knowledge, attitudes, and practices towards COVID-19. The current study aimed to investigate the knowledge, attitude and practice of medical undergraduate students within Baghdad City towards COVID-19.

**Methods:** In this cross-sectional study, 1380 medical students were surveyed online using developed, validated and piloted questionnaire during two week period. Unpaired t-test and One Way ANOVA test were used to assess the association between students' general knowledge, attitudes, practice, and satisfaction to their demographic characteristics.

**Results:** The overall score of students' knowledge about COVID-19 is 91.8% that relied mainly from social media as source of information (36%). More than 90% and three quarters of students have positive attitude and practicing preventive measures towards COVID-19. More than half of students are satisfied with roles played by local health authorities to combat COVID-19. Significant differences were observed among students' KAP with satisfaction and most of their demographic characteristics particularly medical branch of study ( $P < 0.05$ ).

**Conclusion:** Medical students in Baghdad City had generally a higher level of knowledge, possess a positive attitude, and performed a good practice and proactive behaviors of preventive measures towards COVID-19. However, the students were moderately satisfied about the defeating role of the local health authorities towards the illness, hence, our results could be helpful for local health authorities in their awareness campaigns to stem current outbreak.

**Keywords:** COVID-19, knowledge, perception, practice, satisfaction, preventive measures

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## INTRODUCTION

At the end of December 2019, several new cases of lethal pneumonia of unknown etiology have been emerged in Wuhan city, China and called a special concern globally (Zhu et al, 2020). Initial genetic literature revealed that the underlying causal pathogen was a virus which belongs to the Coronavirus family of Coronaviridae (Habibzadeh and Stoneman, 2020). Coronaviruses are a large group of viruses and according to recent evidence, such virus found to be transmitted among birds and mammals, rather humans being were not being apart for such infection and transmission as was seen previously in the severe acute respiratory syndrome-coronavirus (SARS-CoV) in 2002 and the Middle East respiratory syndrome-coronavirus (MERS-CoV) in 2012 (Schoeman and Fielding, 2019).

The current virus outbreak was initially named as 2019 novel coronavirus (2019-nCoV) by the World Health organization. Later on it was updated as SARS-CoV-2 and they named its disease as coronavirus

disease- 2019 (COVID-19) (Lu et al, 2020; Riou and Althaus, 2020). On March 12 of current year, WHO has declared COVID-19 as a worldwide pandemic after infection began to spread rapidly across many countries whose reported the cluster of cases including Iraq (WHO, 2020a).

Similar to other virus family of Coronaviridae, the common manifestations of the COVID-19 were fever, dry cough, dyspnea and bilateral patchy consolidation on chest CT imaging (Huang et al, 2020). However, the WHO revealed that more than two thirds of COVID-19 cases showed mild symptoms that could recovered without any medical intervention, less than one fourth of cases had a severe illness such as shortness of breath, septic shock and/or multi-organs failure, whereas only very few cases can be fatal (WHO, 2020b).

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Statistically the overall mortality rate of SARS-CoV-2 is approximately 2% which is much lower than that of 10% of the Severe Acute Respiratory Syndrome (SARS) and of 34% of Middle East Respiratory Syndrome (MERS) (Mahase, 2020).

In Iraq, COVID-19 was first detected in one Iranian resident student in Najaf City at 24 February 2020 according to the Iraq's Ministry of Health (IMOH, 2020). Then, more cases were reported among Iraqi peoples mostly who have a travel history from Iran, thereafter, the number of confirmed cases transmitted locally are begin to rise day by day in other Iraq cities including Baghdad mostly attributed to rising testing capacity of laboratory investigations (WHO: EMRO, 2020a).

Accordingly, several decisions have been instituted by the Iraqi Government and Ministry of Health with Kurdistan Regional Government representative by Committee for Health and National Safety as an attempt to stem the outbreak spread including closing schools, universities, general shopping centers, cinema houses and banned gathering in public places including all major religious gatherings as well as banned entry of traveler from infected regions (GI: COVID-19, 2020). Further more strict procedures have been done including banning commercial outlets with Iran and Kuwait followed by curfew in all governorates of Iraq and proscription the roaming between governorates in addition to suspend all airports operations (UNOCHA, 2020).

Hitherto of 10<sup>th</sup> of May 2020, the last report of confirmed COVID-19 cases are 2676 of whom 107 were deceased due to COVID-19 with case fatality rate 3.99% and 1702 were recovered and discharged from hospitals (WHO: EMRO, 2020b).

Since the main burden of current outbreak was based on the rapidity of spread of virus across community assisted by its long incubation period to be contagious particularly among asymptomatic patients in addition to un-availability of vaccine or optimum treatment rather than relying mainly on preventive measures, so there is a necessity to disclose the level of knowledge and the practice of infection control measures among medical students as they be a current and future community ambassadors and advisors for all their communities sharing with them the main required information to keep them safe from such infection.

Thus such study is aimed to explore the levels of knowledge, attitudes and preventive measures practice of Iraqi medical undergraduate students of different medical branches within Baghdad city and the findings of such study are expected to increase the level of community awareness, guiding them to modulate and correct some undesired behaviors attempting to limiting the spread of the virus and consequently helping in containment of the ongoing pandemic.

## MATERIALS AND METHODS

The current cross-sectional study survey was conducted with convenience sample of 1380 Iraqi medical undergraduate students of three main medical branches from five Governmental Universities with a total number of around 13,000 medical undergraduate students within Baghdad city from April 25- May 10, 2020. The study was carried out using online self-administered questionnaire distributed through Social Media including specific Facebook, Telegram and Instagram groups of general medical, dental and pharmacy students that used recently in e-learning during current COVID-19 pandemic period.

The target population was those who are studying in such medical Colleges. Despite sample size was calculated by using Epi Info software program with a confidence interval of 95%, a standard deviation of 0.5, and a margin of error of 5%, the required sample size was 385 participants, and 20% were added for contingency (77) of non-response or incorrect answer, then sample size become 462, this being the minimum sample size. However, the sample size was planned to be of not less than 1300 (10%) in order to minimize the effect of chance factor as well as to obtain better representation of target population as for any cross sectional study of as large as sample size being required.

Questionnaire form was developed by authors based on published researches (Alzoubi *et al*, 2020; Peng *et al*, 2020; Taghrir *et al*, 2020; Zhong *et al*, 2020; Giao *et al*, 2020; Mannan and Farhana, 2020). However, it was revised, modified and judged by five Experts in relevant fields of Epidemiology, Virology and Immunology and rather piloted on 65 students who were not included in the final study. The reliability of the questionnaire items was evaluated using internal consistency (Cronbach's alpha) test, and it was found to be (0.76).

The survey questionnaire consists of an interface and five sections with a total number of 28 questions. The questionnaire interface includes the purpose of the study with emphasis about the confidentiality basis. The first section was related to students' demographic characteristics included age, gender, medical branch, grade and source of acquired information regarding COVID-19.

The second section was related to students' knowledge information regarding COVID-19; it composed of nine questions includes disease transmission, its incubation period, symptoms, and the availability of vaccine or specific treatment against it. The third section was related to students' attitudes cornering COVID-19 includes their agitation for getting disease, reputation regarding disease and attending health institution if contracted the infection, in addition to their believes about immunity from acquiring it. The fourth section was related to students' practice of

preventive behaviors to protect themselves from being infected includes intensive hand washing, frequent surface disinfection, avoiding touching their face and reinforcing the social distance procedure by avoiding close contact with suspected people and staying at home. The fifth section was composed of one question related to students' satisfaction regarding the roles played by health authorities in the dealing with COVID-19 pandemic locally. Apart from first section, all responses were provided using Likert- scale (strongly agree, agree, uncertain, disagree and strongly disagree).

The developed English questionnaire version was translated to Arabic language then re-translated to English language to ensure items accuracy and meaningfulness. The final form of Arabic version of questionnaire was reconstructed using Google form and copying it's a shorten URL link that has been shared in specific aforementioned social media.

In order to minimize the bias of missing data, each question items in Google form online questionnaire was constructed to be as a required field highlighted by a warning symbol indicating a warning note if no items were answered. On accomplishment of survey, the students were instructed to submit their responses that were archived in Google drive automatically.

Ethical Approval was obtained by Ethical Committee in the Department of Family and Community Medicine at the college of Medicine at Al- Iraqia University. Other ethical requirements including participation consent with participants' right for refusal and confidentiality were highly explicated and ensured in interface section of questionnaire.

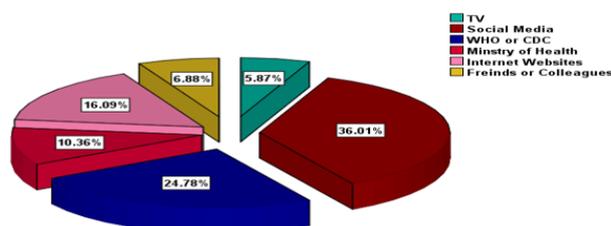
The collected data which retrieved from the online survey were exported into Microsoft Excel and then imported into the Statistical Package for Social Sciences (SPSS) version 25. However, it was been double-checked and analyzed with standard approaches including frequencies and percentages. Unpaired t-test and One Way ANOVA test were used for the computed average Likert scale scores related to students' general knowledge, attitudes and practice in addition to their satisfaction according to their demographic characteristics. A *P* value of < 0.05 was been considered for significance level throughout the study.

## RESULTS

1380 students submitted the completed online questionnaire survey, 65.5% were female vs. 34.5% were males. The age was approximately normally distributed with a mean of 20.68 years old. More than half of students aged less than 20 years old (51%). Most of the students were studying in medicine branch from two Medical Colleges of Baghdad University (Baghdad Medical College and Al-Kindy Medical College) with

**Table 1.** Students' demographic characteristic (n= 1380)

Students' Characteristics	Description	No. (%)
Age	Mean	20.68
	Range (min-max)	9 (18-27)
Age-group	≤ 20	708 (51.3)
	>20	672 (48.7)
Gender	Female	904 (65.5)
	Male	476 (34.5)
Medical Branch	Medicine	830 (60.1)
	Dentistry	298 (21.6)
	Pharmacy	252 (18.3)
University	Baghdad University	452 (32.8)
	Al-Kindy Medical College Al-Nahrain	76 (5.5)
	University Al-Iraqia University	101 (7.3)
	Al- Mustansiriyia university	391 (28.3)
	Ibn-Sina medical University	291 (21.1)
		69 (5.0)
Grade	First year	405 (29.3)
	Second year	317 (23.0)
	Third year	185 (13.4)
	Fourth year	276 (20.0)
	Fifth year	118 (8.6)
	Sixth year	79 (5.7)



**Fig. 1.** Students' source of Information about COVID-19 WHO: World Health Organization, CDC

more than one quarter of them were in first grade (29.3%) (**Table 1**).

Regarding students various sources of information about COVID-19. Social media was the commonest one (36%) followed by the WHO or CDC (24.78%), Internet websites (16%), Ministry of Health (10.36%), friends or colleagues (6.8%) and TV (5.8%) (**Fig. 1**).

Regarding students' knowledge about the COVID-19, we found that the majority of students had very much knowledge regarding disease mode of transmission, its clinical manifestations, its preventive measures like washing hand and wearing masks and its serious complications in elder people and those with underlying chronic diseases (89.7%, 87.4%, 85.3%, 88.7%, 89.2%) respectively. However, more than two-thirds of students knew well about disease incubation period and uneffectiveness of antibiotic treatment or even unavailability of vaccine or definitive cure for it (73.1%, 66.9%, 71.1% and 74.8%) respectively. The overall level of knowledge was good, as 91.8% of the students possessing sufficient knowledge about COVID-19 verse 8.2% had poor knowledge either not-familiar or uncertain about it (**Table 2**).

**Table 2.** Students' knowledge about COVID-19 (n= 1380)

COVID-19 Perception		Scale responses					Statistical Significance	
		Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Mean ± SD	% correct answer*
The COVID-19 virus spreads by respiratory droplets of infected individuals	No.	14	93	35	406	832	4.41 ± 0.905	89.7
	%	1.0	6.7	2.5	29.4	60.3		
COVID-19 symptom appear within 2-14 days of infection	No.	97	35	114	689	445	3.98 ± 1.067	73.1
	%	7.0	2.5	8.3	49.9	23.2		
The main clinical symptoms of COVID-19 are fever, dry cough and fatigue	No.	27	82	66	601	604	4.21 ± 0.925	87.4
	%	2.0	5.9	4.8	43.6	43.8		
Shortness of breath is a also a symptom of COVID-19	No.	42	64	97	541	636	4.21 ± 0.974	85.3
	%	3.0	4.6	7.0	39.2	46.1		
Antibiotics are not the first line treatment	No.	28	117	313	470	452	3.87 ± 1.030	66.9
	%	2.0	8.5	22.7	34.1	32.8		
Washing hands with soap and water, and using face masks can help you in the prevention of disease transmission	No.	64	33	59	452	772	4.33 ± 1.004	88.7
	%	4.6	2.4	4.3	32.8	55.9		
COVID-19 has no vaccine	No.	65	127	206	475	507	3.89 ± 1.139	71.1
	%	4.7	9.2	14.9	34.4	36.7		
Till now there is no effective cure for COVID-19	No.	73	93	181	508	525	3.96 ± 1.121	74.8
	%	5.3	6.7	13.1	36.8	38.0		
COVID-19 is more dangerous in older adults and those with underlying chronic disease	No.	59	50	40	306	925	4.44 ± 1.018	89.2
	%	4.3	3.6	2.9	22.2	67.0		
Computed mean of general Knowledge						4.1443 ± 0.76502	91.8	

\*: % of correct answer; % of both agrees and strongly agrees

**Table 3.** Students' perception about COVID-19 (n= 1380)

COVID-19 Knowledge		Scale responses					Statistical Significance	
		Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Mean ± SD	% of positive attitude*
You think you will probably get illness	No.	18	143	510	470	239	3.56 ± 0.938	51.4
	%	1.3	10.4	37.0	34.1	17.3		
You are worried as one of your family members may get an infection	No.	153	194	293	438	302	3.39 ± 1.274	53.6
	%	11.1	14.1	21.2	31.7	21.9		
Virus is not a stigma and I should not hide my infection	No.	55	51	14	191	1069	4.57 ± 0.983	91.3
	%	4.0	3.7	1.0	13.8	77.5		
If getting infected, I will go to health institution as advised	No.	66	58	38	255	963	4.44 ± 1.062	88.3
	%	4.8	4.2	2.8	18.5	69.8		
If getting COVID-19, you will accept isolation in health facilities	No.	60	75	66	323	856	4.33 ± 1.080	85.4
	%	4.3	5.4	4.8	23.4	62.0		
If a COVID-19 vaccine was available, I would have it	No.	60	64	138	367	751	4.22 ± 1.083	81
	%	4.3	4.6	10.0	26.6	54.4		
I can get infected if I contacted an infected patient despite my good immunity	No.	44	76	127	534	599	4.14 ± 1.008	82.1
	%	3.2	5.5	9.2	38.7	43.4		
I can get infected if I contacted an infected patient despite of my strong beliefs	No.	63	49	66	318	884	4.38 ± 1.046	87.1
	%	4.6	3.6	4.8	23.0	64.1		
Computed mean of general attitude						4.1299 ± 0.66269	90.8	

\*: % of +ve attitude; % of both agrees and strongly agrees

In respect to students' perception towards COVID-19, more than three quarters of students respond positively about the disease with general level of perception towards COVID-19 was 90.8%. Nevertheless, there were some negative attitudes, particularly regarding risk perceptions; as more than half of students thought that they would probably get the infection and they worried about one of their family members might get a disease (51.4% and 53.6%) respectively, but they will accept that the illness is not a stigma and they doesn't thought to hide their infection (91.3%) (**Table 3**).

Concerning to students' self-reported practice of preventive measures against getting infection, generally 87% of them were practicing a preventive measures positively; more than two thirds of them were washing their hands with soap and water at least 20 seconds, they used tissues in case of coughing or sneezing,

disinfect touched objects and surface frequently, avoiding touching their faces (75.7%, 79.6%, 75%, 69.5%) respectively. Furthermore, they highly accepted to stay at home during pandemic period and avoiding a close contact with suspected cases (83.1% and 90.1%) (**Table 4**).

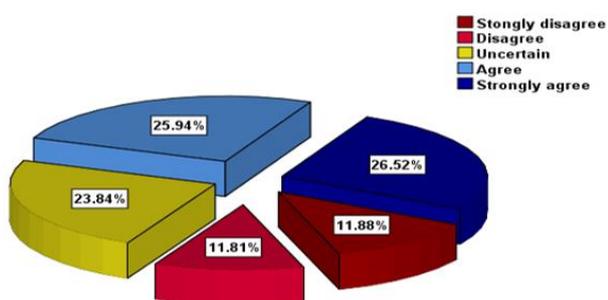
In regards to student's satisfaction about the role of local health authorities to combat the COVID-19 pandemic, the collective scores of agreements toward such satisfaction were in more than half of them (52.46%) with computed average of 3.43 (**Fig. 2**).

Regarding the association of students' demographic characteristics and their average knowledge, attitude, practice and satisfaction, a significant difference was observed in their age group. The average scores of practicing preventive measures and satisfaction on the role of local health authorities were significantly higher

**Table 4.** Students' practice of preventive measures against getting COVID-19 (n= 1380)

COVID-19 Knowledge	Scale responses					Statistical Significance	
	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Mean ± SD	% of positive practice*
I washing my hands often with soap and water for at least 20 seconds	No. 67 % 4.9	84 6.1	185 13.4	521 37.8	523 37.9	3.98 ± 1.093	75.7
I cover my cough or sneeze with a tissue, then I throw the tissue in the trash	No. 60 % 4.3	99 7.2	123 8.9	480 34.8	618 44.8	4.08 ± 1.100	79.6
I frequently clean and disinfect touched objects and surfaces	No. 74 % 5.4	81 5.9	190 13.8	527 38.2	508 36.8	3.95 ± 1.105	75
I avoid the close contact with people who are suspected or sick	No. 54 % 3.9	50 3.6	32 2.3	253 18.3	991 71.8	4.51 ± 0.992	90.1
I avoid touching my face especially eyes, nose or mouth	No. 71 % 5.1	111 8.0	239 17.3	504 36.5	455 33.0	3.84 ± 1.124	69.5
I stay at home as long as possible during the period of this pandemic	No. 59 % 4.3	66 4.8	108 7.8	335 24.3	812 58.8	4.29 ± 1.078	83.1
Computed mean of general practice						4.1079 ± 0.90886	87

\*: % of +ve practice; % of both agrees and strongly agrees



**Fig. 2.** Students' satisfaction about COVID-19 management by local health authorities (Mean ± SD: 3.43 ± 1.314)

among female students than male one ( $t$ : 3.999,  $P$  = 0.000 and  $t$ : 2.098,  $P$  = 0.036) respectively.

There was a statistical significant difference among students' medical branch of study regarding their knowledge, attitude, practice and satisfaction. The average cumulative scores of agreements of such variables were significantly more among those who study general medicine, than those who studying dentistry that's rather were more than those studying pharmacy ( $F$ : 66.345,  $P$  = 0.000,  $F$ : 47.041,  $P$  = 0.000,  $F$ : 42.573,  $P$  = 0.000,  $F$ : 15.566,  $P$  = 0.000) respectively.

Similarly, statistical significant differences were observed among students' grade and their study university in respect to their average scores of knowledge, attitude, practice and satisfaction about COVID-19 (Table 5).

**Table 5.** Students' demographics differences in their knowledge, perception, practice and satisfaction about COVID-19 (n= 1380)

Students characteristics	n	Knowledge	Attitude	Practice	Satisfaction
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
<b>Age-group</b>					
≤ 20	708	4.0570± 0.84680	4.0719± 0.71792	4.0410± 0.98018	3.35± 1.326
>20	672	4.2363± 0.65630	4.1910± 0.59344	4.1783± 0.82195	3.52± 1.296
Significance*		$t$ : 4.409, $P$ = 0.000	$t$ : 3.368, $P$ = 0.001	$t$ : 2.826, $P$ = 0.005	$t$ : 2.312, $P$ = 0.021
<b>Gender</b>					
Female	904	4.1350± 0.76690	4.1156± 0.66583	4.1785± 0.90164	3.49± 1.290
Male	476	4.1620± 0.76193	4.1570± 0.65651	3.9737± 0.90835	3.33± 1.355
Significance*		$t$ : 0.624, $P$ = 0.533	$t$ : 1.104, $P$ = 0.270	$t$ : 3.999, $P$ = 0.000	$t$ : 2.098, $P$ = 0.036
<b>Medical Branch</b>					
Medicine	830	4.3224± 0.45172	4.2593± 0.45112	4.2783± 0.62916	3.59± 1.221
Dentistry	298	3.9623± 0.91635	4.0113± 0.80228	3.9452± 1.10274	3.18± 1.423
Pharmacy	252	3.7729± 1.12485	3.8438± 0.90810	3.7388± 1.23598	3.21± 1.398
Significance**		$F$ : 66.345, $P$ = 0.000	$F$ : 47.041, $P$ = 0.000	$F$ : 42.573, $P$ = 0.000	$F$ : 15.566, $P$ = 0.000
<b>University</b>					
Baghdad	452	3.9781± 0.98166	3.9953± 0.78900	3.9347± 1.08182	3.25± 1.405
Al-Kindy College	76	4.1433± 0.73721	4.2023± 0.70355	3.9583± 0.93100	3.57± 1.193
Al-Nahrain	101	4.1837± 0.74989	4.1646± 0.71325	4.1650± 0.87575	3.55± 1.300
Al-Iraqia	391	4.1893± 0.68682	4.1266± 0.62835	4.1343± 0.88800	3.52± 1.248
Al-Mustansiriyya	291	4.3074± 0.39040	4.2745± 0.38182	4.3356± 0.55880	3.47± 1.260
Ibn-Sina	69	4.2335± 0.61338	4.2899± 0.59428	4.2126± 0.76477	3.71± 1.330
Significance**		$F$ : 7.599, $P$ = 0.000	$F$ : 7.727, $P$ = 0.000	$F$ : 7.867, $P$ = 0.000	$F$ : 3.126, $P$ = 0.008
<b>Grade</b>					
First year	405	3.9687± 0.93643	4.0287± 0.78334	3.9712± 1.05715	3.27± 1.382
Second year	317	4.1570± 0.75201	4.1053± 0.66917	4.0936± 0.94272	3.52± 1.289
Third year	185	4.2865± 0.50714	4.2419± 0.49361	4.2613± 0.60685	3.51± 1.273
Fourth year	276	4.1598± 0.72319	4.1630± 0.63149	4.0948± 0.89689	3.39± 1.304
Fifth year	118	4.3540± 0.55202	4.2722± 0.48443	4.3814± 0.56786	3.64± 1.285
Sixth year	79	4.2925± 0.55504	4.1566± 0.56418	4.1435± 0.87043	3.61± 1.148
Significance**		$F$ : 8.159, $P$ = 0.000	$F$ : 4.338, $P$ = 0.001	$F$ : 5.150, $P$ = 0.000	$F$ : 2.603, $P$ = 0.024

\*: unpaired t-test, \*\*: One Way ANOVA test

## DISCUSSION

For any infectious disease, the levels of knowledge, perception and practice of preventive and control measures could be affected by several agent factors including its infectivity, its spread and its virulence or severity that measured by case fatality rate (Alzoubi et al, 2020). Nevertheless, such levels of knowledge, perception and practices about COVID-19 has been undergone daily several variations after WHO announced the disease as pandemic (WHO, 2020a) added with ongoing various controversial reports and theories published frequently (Vidon, 2020). For that reasons, much of researches across countries have been performed determined the magnitude of their medical students knowledge, attitude and practice in attempt for helping health authorities for establishment of effective campaign of primary preventive and control measures. Up to the best of our knowledge, this is the first study has been carried out in Iraq that provides an insight to the knowledge, perception and practice of preventive measures of the medical undergraduate students in Baghdad city towards COVID-19.

Regarding the level of knowledge about COVID-19, majority of students had a good knowledge regarding the disease including its mode of transmission, the incubation period, clinical manifestations, preventive measures, availability of vaccine or effective drugs and its serious complications in high risk groups, with more than 90% of the students found to be familiar for such different aspects of COVID-19. These findings are in consistence with what were reported by other studies (Alzoubi et al, 2020; Peng et al, 2020; Taghrir et al, 2020). In contrast, the Bangladeshi study of (Mannan and Farhana, 2020) indicated that only medical students were found to lack a proper and basic knowledge regarding COVID-19. However, such variation could be attributed to the differences in study design including target population.

Furthermore, the general level of knowledge was significantly different among most of students' demographic characteristics. Medical students who aged >20 years found to have a more knowledge about COVID-19 than those aged  $\leq 20$  and such finding could also reflected by their grade as the level of knowledge found to be increased progressively with level of education and such finding could explain students' deep understanding and discrimination the skeptical information about COVID-19 in the literature and Media controversially. A significant difference was also found regarding medical branch studying, which is more or less reflected by type of universities they studying in; where an average scores of knowledge were significantly more among those who study general medicine, than those who studying dentistry, and the latter were found to be more familiar than those studying pharmacy, and such difference could be attributed to the

inadequate feedback learning on infectious disease issues particularly in Pharmacy branch and lack of reinforcement of the such subject education while the students advanced in the academic curriculum. Similarly the difference among universities could be explained to the variation in educational curricula among universities. Such finding is in contrast to what was reported by the study of (Taghrir et al, 2020) in Iran showed that no significant differences were recognized between medical students' knowledge and their demographic characteristics. However our finding was in the line of such Iranian study reported that no significant gender difference was found among students' knowledge about COVID-19.

Concerning the level of students' attitude towards COVID-19, the study finding indicated that most of the students had positive attitude toward the disease preventive measures and their reaction if they contracted the infection, with overall score of perception towards COVID-19 was also more than 90%. This finding is supported by other studies (Alzoubi et al, 2020; Peng et al, 2020; Taghrir et al, 2020). In spite students' risk perceptions were more than half of our students, but its average scores are found to be lower and higher than what were reported by studies of (Alzoubi et al.2020) in Jordan and (Taghrir et al. 2020) in Iran respectively and such discrepancies could be explained to the differences in study design. Likewise, the general level of attitude was significantly different among students' demographic characteristics including their age group, medical branch, grade and university, whereas no significant gender differences was observed regarding students' attitude towards COVID-19, which are also supported by study of (Taghrir et al, 2020) with exception of that, such Iranian study found a significant gender differences regarding risk perception that could be attributed to the differences in study method of analysis.

In respect to level of preventive measures practice, generally most of our students found to practicing a preventive measure positively including washing their hands, using tissues in case of coughing or sneezing, disinfect touched objects and surface frequently, avoiding touching their faces, and majority of them accepted to stay at home during pandemic period and avoiding a close contact with suspected cases. These findings are in the line of other studies (Alzoubi et al, 2020; Peng et al, 2020; Taghrir et al, 2020). Moreover, the average score of practice found to be significantly different with all students' demographic characteristics in our study in contrast to that reported by (Taghrir et al, 2020) that could be assigned to the differences in study methodology including sample size.

The current study resulted that more than half of students were satisfied about the role of local health authorities to combat the COVID-19 pandemic. This finding is in concordance with what was reported by (Alzoubi et al, 2020) study revealed that 69.3% of

students were satisfied with the steps of Jordanian ministry of health to contain COVID-19. Similarly, our study found significant differences between students' general level of satisfaction and all their demographic factors. On the other hand, the study of (Alzoubi et al, 2020) reported that no significant difference was found regarding satisfaction among medical and non-medical students.

Another interesting finding in this study was the source of information about COVID-19, as social media was the commonest one followed by the WHO or CDC, Internet websites, Ministry of Health, friends or colleagues and TV which is more or less in consistent line of other studies (Alzoubi et al, 2020; Peng et al, 2020; Taghrir et al, 2020; Zhong et al, 2020; Giao et al, 2020; Mannan and Farhana, 2020). In contrast, the Iranian study of (Taghrir et al, 2020) revealed that the commonest source of students' information about COVID -19 was WHO, CDC followed by national guidelines and such differences could be explained to the differences in applied study methodology including social media source item choice nonexistence.

Although the limitation of this study was that it carried out using self-administered questionnaire which is relied mainly on the students' self-report assessment of their own knowledge, perception and practice. However, the study results could reflect that the students with such representative sample size have an accepted experience sufficient to be important advisors to the community in attempt to help local health authorities to

contain the ongoing spread of the COVID-19 outbreak for at least within Baghdad city.

## CONCLUSION

Based on study evidence, the medical students in Baghdad City had generally a higher level of knowledge, possess a positive attitude, and performed a good practice and proactive behaviors of preventive measures towards COVID-19. Nevertheless, the students had a moderate level of risk perception and satisfaction regarding the defeating role of the local health authorities about the illness, that require an urgent need to up-surgng the level of awareness campaigns particularly by Ministry of Health as the minority of students in this study sample follow it as a source of information. The significant differences between students' KAP with their satisfaction about COVID-19 and their demographic characteristics particularly medical branch were the most amazing finding in this study. This study could be fruitful for providing baseline information that could be helpful for local health authorities in their awareness campaigns, additionally in conducting further researches particularly targeting all Iraq universities of both medical and non-medical students.

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