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COVID-19: Preventive knowledge and practices among Moroccan high school students

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***Abstract*---**Coronavirus 2019 (COVID-19) has been recognized as a pandemic by the World Health Organization. Global efforts have been made to prevent the spread of the disease through political decisions and personal behaviors. In Morocco, a series of measures have been adopted to control the spread of the COVID-19 pandemic. This study was conducted to assess the knowledge and practices regarding COVID-19 among Moroccan high school students. All subjects were interviewed using an online questionnaire that tested their knowledge and preventive practices concerning COVID-19. Analysis of socio-demographic data showed that 56.33% were girls, aged between 15 and 18 years (85.3%), the majority was science students (95.3%), from urban areas of the Settat-Casablanca region. The survey revealed that

social media was the main source of knowledge about the COVID-19, the majority of students (96%) surveyed high school students followed the information of the evolution of the COVID-19 pandemic, 97% of learners confirmed keeping the recommended social distance, while 68.60% actually practice this measure, 82.40% of high school students are aware of the persistence of Covid on surfaces, more than half of the participants do not shake hands greeting each other (56.40%). 78.40% of the participants wash their hands regularly against 20% who do not practice it, although they are aware of the importance of this measure. 95% confirmed that sneezing or coughing into the arm/elbow can prevent the spread of COVID-19, but only 89.20% applied this protective gesture. 93.20% knew that using a bib protects against infection, but 74.70% of students wore one. The statistical analysis showed a significant difference between the practices and the knowledge of the participants ($p<0.05$). Most of the high school students in this study have good knowledge, but many preventive measures are not followed by a many participants, which underlines the need to create awareness of COVID-19 infection among students and particularly those under 15 years of age. This underscores the need to sensitize pupils to COVID-19 infection, especially those under the age of 15, and to integrate preventive health education into the formal curriculum for learners who have a major role in the transmission of infectious diseases and in the control of pandemics.

***Keywords*---**COVID-19, Pandemic, secondary learners, Morocco, knowledge, practices.

Introduction

Coronaviruses are a family of different single-stranded RNA viruses, only certain types of which are thought to cause infections in humans (Burrell et al., 2017). These human coronaviruses generally cause mild respiratory disease, new human coronaviruses, such as severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS) and COVID-19 can cause more severe symptoms (Burrell et al., 2017 ; Coleman et Frieman 2014 ; Graham et al., 2013 ; Ines Steffens, 2020; Weston and Frieman 2020 ; Boulos and Geraghty. 2020). . On December 31, 2019, China reports the first cases of COVID-19 in Wuhan, the infection spread rapidly towards the end of 2019 causing a global health crisis, with an unexpectedly high death rate worldwide (Fontela, 2020 ; Velavan and Meyer, 2020 : Wu et al., 2020). On 11 March the WHO Director- General called COVID-19 a pandemic, noting that this is the first time a pandemic has been caused by a coronavirus. In Morocco, the government has taken strict measures, following the registration of a first confirmed case of COVID-19 on March 13, the Ministry of National Education, Vocational Training, Higher Education and Scientific Research (MEN) decided to close nurseries, schools, colleges, high schools, and universities from 16 March 2020. On 19 March, the Ministry of the Interior declared a state of health emergency and restricted traffic in Morocco and declared this as the only inescapable means of bringing the coronavirus under

control (emergency bulletin). September 7, 2020, was marked by the reopening of schools where more than 80% of Moroccan families had chosen the attendance option even though the pandemic was not under control. According to the MEN, 229 schools were closed after the discovery of COVID-19 positive cases (Naji, 2020).

The Ministry of National Education published on its Facebook page on January 12, 2022, a bulletin on the epidemiological situation in public and private schools in Morocco. According to this bulletin, a total of 2,596 cases were reported in schools from 4 to 10 January 2022. Nationally, 36 schools and 17 foreign mission schools were closed, including 25 schools in the Casablanca-Settat region, this which, given its economic and demographic importance, recorded the highest number of cases during the entire pandemic period (REF).

Adolescents are more likely to engage in risky health practices related to COVID-19 and their adherence to infection control measures are a key factor in mitigating the spread of the disease (Dardas et al., 2020).(Therefore, it is important to ascertain their levels of knowledge and perception of COVID-19, as well as their preventive measures.

This study aims to assess the knowledge and practices adopted by Moroccan high school students during the COVID-19 pandemic and to estimate their awareness of the severity of this pandemic, using an online questionnaire. At the same time, the correlation between knowledge and practices of these preventive measures and socio-demographic characteristics was assessed. This young category is targeted for the first time in view of its major role in the transmission of COVID-19 and in the control of the pandemic, at the start of the school year.

Methods

This study was conducted among 213 secondary school learners after the start of the school year (October 2021) and with an age group of 15 to 18 years. The data collection was carried out during the period when the COVID-19 situation was very active in the world and control measures had not yet been relaxed in Morocco.

Questionnaire
The questionnaire used in this study consists of :
-Closed binary choice questions where two alternative answers offered yes/no.
The questions focused specifically on learners' knowledge and practices. The survey questions were adapted and modified from World Health Organization publications.

Statistical analysis of results
Statistical analysis was performed using JMP SAS 11.0.0 software (SAS Institute Inc., Cory, NC, USA). The statistical interpretation of the results was carried out using the ANOVA test. The difference was considered statistically significant when p is less than 0.05. The graphical representation was performed using Microsoft Excel 2019.

Table 1.
Demographic characteristics participants (N=213)

Demographic characteristics	Number	Percent (%)
Gender:		
Male	93	43.66
Female	120	56.33
Age (Years):		
> 18	26	12.30
18-15	175	82.50
< 15	11	5.20
Education:		
First year high school (Tc)	62	29.20
Second year high school (1bac)	77	34.40
High school baccalaureate (2bac)	73	36.30
Specialty		
Scientist	102	95.30
Literary	10	4.70

Ethical considerations
The study was conducted in accordance with institutional research ethics. Formal approval was granted by the Regional Directorate of Education of Settat. Anonymity and confidentiality were strictly maintained.

Results

Socio-demographic characteristics

Table 1 presents the general characteristics of the 213 Moroccan students surveyed, almost all of whom were in science courses (95.30%) aged between 15 and 18 years (82.5%). Almost half of the participants were girls (56.33%). 70.7% of these students are studying in the 1st and 2nd years of baccalaureate and 29.20% are in the common core.

Source of information on Covid

The majority (96%) of the high school students surveyed followed the information on the evolution of the COVID-19 pandemic in Morocco disseminated by the Moroccan Ministry of Health (MSM), 51% daily and 44% occasionally (Figure 1A). 57% of the learners surveyed use the internet as theirmain source of information about COVID-19, including social media (13%), followed by national television (43%) (Figure 1B).

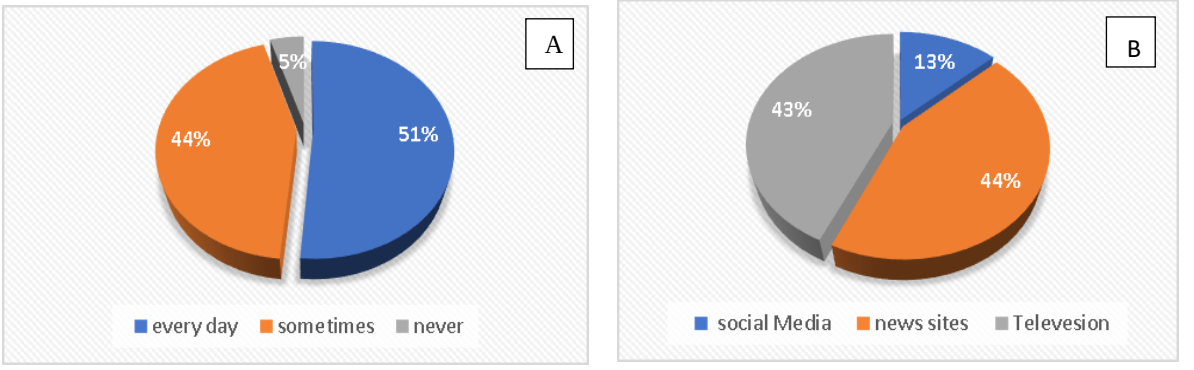

Figure 1. Source of knowledge about COVID-19 A; The frequency of information B

Correlation of participants' socio-demographic characteristics with knowledge andpractices

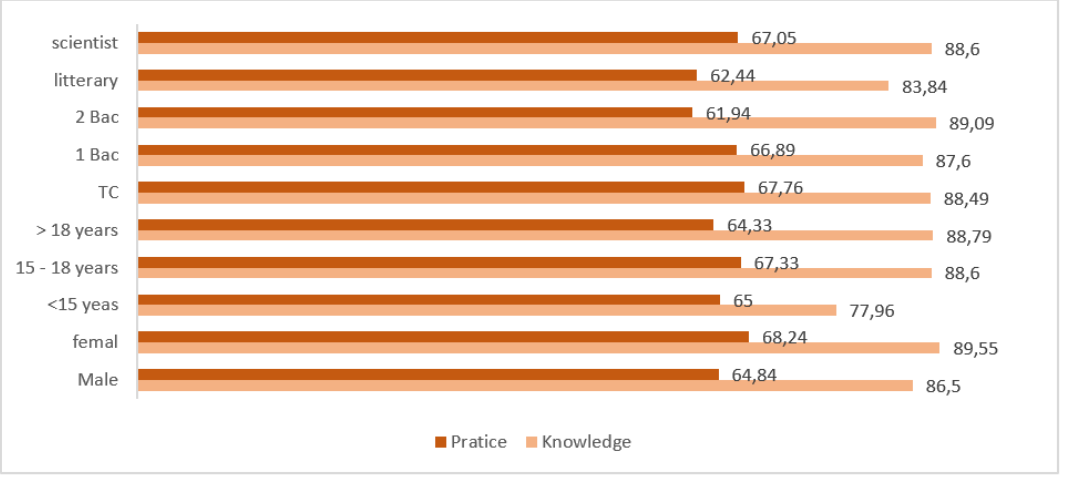

Figure 2. Relationship between knowledge, pratices and demographic characteristics participants

Figure 2 shows the level of knowledge and practice of learners according to socio-demographic characteristics. The knowledge of the learners varies from 77.96% to 89.55%. The youngest (<15 years) have less knowledge (77.96%) with a significant difference ($p<0.05$), so the level of knowledge is correlated with age, but the other socio-demographic variables do not show any significant difference ($p>0.05$). In general, the learners surveyed present low-risk practices in relation to knowledge, practices of preventive measures remain much lower than knowledge ($p<0.05$), its scores change according to socio-demographic characteristics, girls (68.24%) are more applied than boys, baccalaureate high school students (68.24%) respect prevention measures less than those in the common core curriculum (68.24%), scientific learners (67.05%) are more aware than literary learners (62.44%), reaching the last criterion, we find that the

youngest (< 15 years) who have less knowledge (77.96%), respect the recommended measures less (65%) than the oldest (15-18) (67.76%).

Correlation of Knowledge to Practice on COVID-19

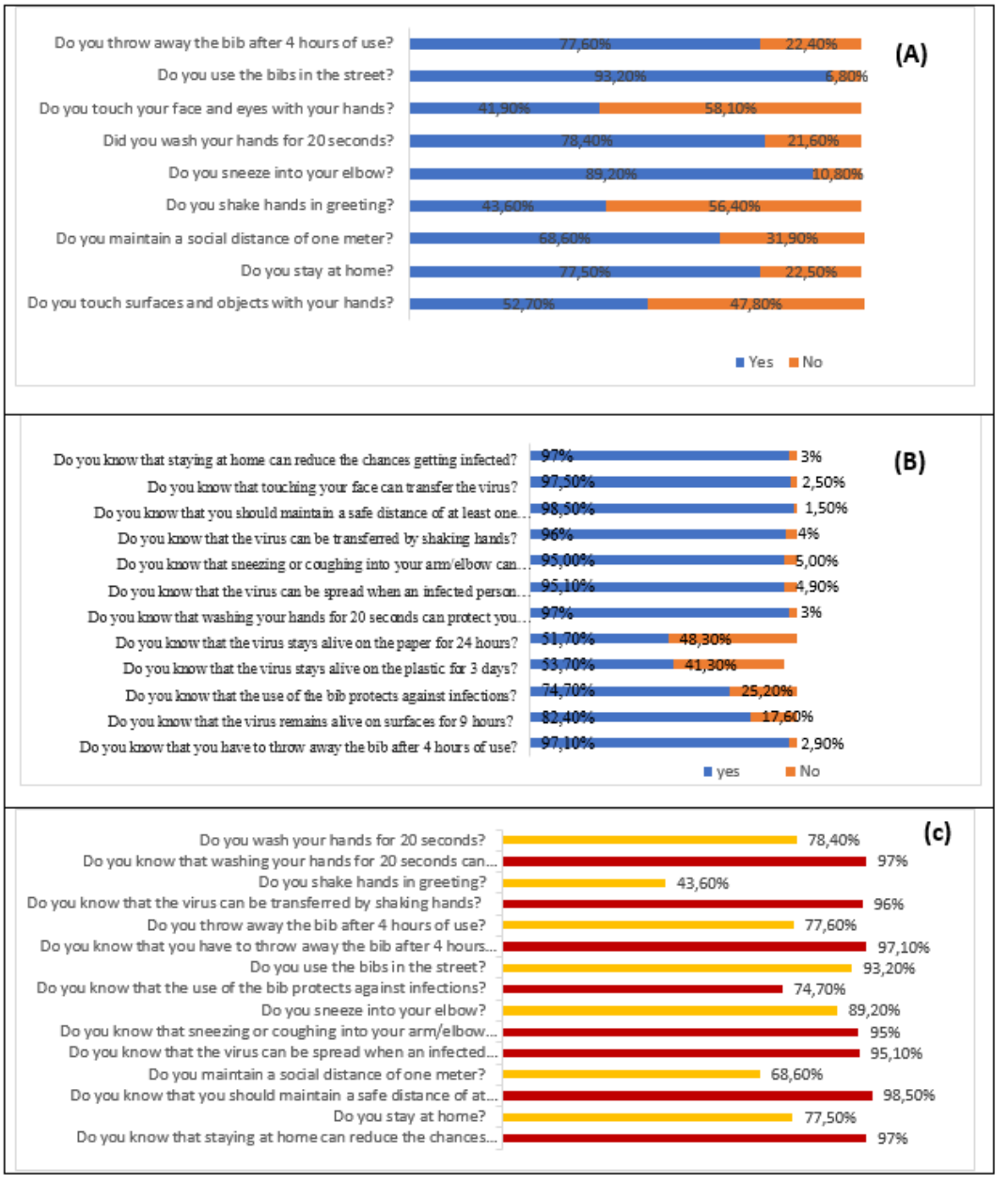

Figure 3. (A). High school student's knowledge regarding COVID-19; (B). High school student's practices regarding Covid; (C). Relationship between knowledge- and practice-based questions.

Figure 3 shows the knowledge and practices of the students surveyed during the COVID-19 pandemic. In general, the learners surveyed have a good level of knowledge and present low-risk practices. A significant difference was observed between knowledge and practices ($p < 0.05$).

Social distancing

The transmission of the Covid virus can be reduced by staying at home, 97% of the learners surveyed confirmed this information (Figure 4). However, only 77.50% of the participants stayed at home (Figure 3C). Outdoors, social distancing of at least one meter should be maintained when meeting people, especially in a closed area. 98.50% of the high school students surveyed say they were aware of the importance of distancing (Figure 3A), while 68.60% practised this measure. 1.5% of the participants were unawarw of the importance of distancing (Figure 3C).

Barrier gestures

The survival time of the covid virus varies according to the nature of the surfaces, 82.40% of high school students are aware of the persistence of the covid for 9 hours on surfaces (Figure 3B), 3 days on plastic (53.70%), and 24 hours on paper (51.70%). Despite their statements, 45.70% of the participants shared school supplies with their classmates, 52.70% continued to unconsciously touch any type of surface (Figure 3B).

The COVID-19 respiratory virus can be contracted by shaking hands and touching contaminated surfaces and then touching the eyes, nose or mouth. Most participants (96%, 97.50%) confirmed this information (Figure 3A), with more than half of the participants not shaking hands when greeting (56.40%) and not touching their hands. eyes, nose or mouth (58.10%) (Figure 3C). While the others or breathes deeply. This information was (41.90%) find these reflexive gestures difficult to avoid.

Regular hand washing with soap for 20 seconds protects against COVID-19. Many of the students (97%) are aware, however 78.40% of the participants practice this measure against 20% do not practice it even if they are aware of it (Figure 3C). While 3% are unaware this simple gesture which can save their life and that of their relatives (Figure 3A).

Protection measures

The COVID-19 virus can be spread when small liquid particles are expelled through the mouth or nose when an infected person coughs, sneezes, speaks, confirmed by 95.10% of the high school students questioned and only 4.90% were unaware of it. Protective measures include the use of a handkerchief or the bend of the elbow to cover sneezes and coughs. Of the 213 participants, 95% confirmed that sneezing or coughing into the arm/elbow can prevent the spread of COVID-19, 89.20% applied this protective measure, 5.8% were aware of its importance but did not practice it and 5% did not know.

Masks are one of the key measures that help reduce the transmission and can save lives. The majority of participants (93.20%) were aware that the use of bibs protects against infection, especially in enclosed spaces. While 74.70% of the participants wore bibs, the other students (21.14%) were aware of the importance of this measure but did not respect it. Medical masks are for single use. They should be discarded immediately after 4 hours of use or if dirty or wet, preferably in a closed bin (OMS ,2021). Almost all (97.10%) of the students stated they had thrown away their bibs after use, including 69.27% after 4 hours of use and 27.81% who were aware of the importance of this essential measure but did not practice it.

Discussion

The present study aims to assess the knowledge and practices of preventive measures, recommended by the WHO regarding COVID-19, of Moroccan high school students aged 15 to 18 years, half of the participants are girls and the majority studying in scientific options. Knowledge and practices related to COVID-19 have been assessed in different populations (Saqlain et al., 2020; Clements, 2020; Al-Hanawi et al., 2020 ; Zhang et al., 2020 ; Reuben et al., 2020 ; Srichan et al., 2020; Salman et al., 2020; Yue et al., 2021; Gao et al., 2020; Ladiwala et al., 2021; Hatabu et al., 2020; Azlan et al., 2020; Bazaid et al., 2020; Olaimat et al., 2020), but no study has targeted Moroccan high school students.

During the pandemic, Morocco adopted a public awareness plan on the COVID-19 pandemic, with continuous media monitoring of the country's health situation. Additionally, educational materials and brochures have been made available online and in schools by MSM (MSM, 2020; Ait ali et al., 2020). Our results showed that the majority of participants (96%) followed information from the MoroccanMinistry of Health (MSM) on national channels. These results are higher than those reported by AbuAlhommos et al. (2021) which showed that only 68.3% of participants followed information from the Saudi Ministry of Health. Improving the reliability and keeping information about COVID-19 on social media up to date would help raise awareness. More than half of the high school students surveyed (57%) used the internet, including social media, as their main source of information, which agrees with other work (58.5%, 60%) (Abdelhafz et al., 2020; Bhagavathula et al., 2020). These results are justified by the fact that young people rely on the internet and social networks in their regular activities.

Our results revealed that a large proportion of the participants (77.96%-89.55%) have good knowledge, which is similar to several studies (Saqlain et al., 2020 ; Clements, 2020; Al-Hanawi et al., 2020; Zhang et al., 2020 ; Reuben et al., AbuAlhommos et al., 2021; Al Hanawi et al., 2020; Abdelhafz et al., 2020; Alsharqi et al., 2021; Asaad et al., 2020; Siddiqui et al., 2020). This shows the success of the awareness plan employed by the Moroccan government during the pandemic. However, these results differ from studies conducted in in the border population of northern Thailand at the start of the pandemic, which found that 73% of participants had poor knowledge (MacIntyre et al., 2020). This difference can be explained both by the duration of the study and by the socio-demographic characteristics of the participants. Our results revealed a

correlation of knowledge with age and no significant difference was observed with respect to other socio- demographic variables, which is confirmed by the study conducted by Bukasa Tshilonda et al. (2021) who showed that participants under the age of 18 had less knowledge about COVID-19 while level of education showed no significant difference. This low knowledge may be explained by the low mortality observed in this age group, which does not feel affected by the COVID-19 virus (Yang et al., 2020). In contrast, other studies have shown that the level of education and gender positively influence knowledge (Al-Hanawi et al., 2020; MacIntyre et al., 2020; Yue et al., 2021; Gao et al., 2020; Ladiwala et al., 2021; Hatabu et al., 2020).

The WHO advises staying at home as much as possible, keeping social distance and washing hands with soap for 20 seconds. Most participants (97% to 98.5%) agreed that these preventive measures can reduce the spread of the virus; these results are in agreement with the work of El Hanawi et al. 2020 in the Saudi population (91%), but this rate is only 40% in the Indian population (Roya et al., 2020).

Only 68.60% of participants maintain social distancing, it is difficult for young people to comply with government protocols on distancing as they are in a period of collective activities (Ningsih et al., 2021). Several factors influence compliance behaviour, parental authority, biological and psychosocial (egocentricity) and environmental factors can lead to behavioral risks in preventing the spread of COVID-19, (O'Donohue, Benuto and Tolle, 2013).

The work of Siddiqui et al., (2020) and Abdelhafz et al., (2020) showed a good level of knowledge on the transmission of COVID-19 among respondents (95%). About 95.70% of the students surveyed knew that the disease can be caused by human transmission when infected persons cough or sneeze, 82.40% by touching surfaces and objects contaminated with the virus, 97.50% bytouch the face and 96% by shaking hands, confirming the satisfactory level of sensitivity of the students on the mode of transmission of this virus and therefore maintaining continuous vigilance by adopting good protective gestures. In contrast, only two-thirds of the participants surveyed generally practice preventive measures. Harper et al., (2020) pointed out that a higher level of knowledge is not enough to ensure that adolescents comply with measures to prevent transmission of COVID-19.

About three quarters of participants knew that wearing a face mask could protect against infection, with 93% willing to do so. Almost all participants in a Chinese study used to wear face masks when they went out (Reuben et al., 2020). This result could be explained by risk perception, as also shown in a study in Indonesia that risk perception had a positive influence on preventive behaviour (Fenitra et al., 2021). Suyen Ningsih et al. (2021) showed that adolescents with a sense of social responsibility were more compliant in applying health protocols during the COVID-19 pandemic.

Statistical analysis showed a significant difference between students' knowledge and practices ($p<0.05$), but the study by Zhong et al. (2020) reported that a good knowledge of COVID-19 is closely related to the application of preventive measures.

Conclusion

The present study highlights the need to create awareness of practical measures to reduce the spread of COVID-19 among students and particularly those under 15 years old. In addition to improving the reliability and timelines of about COVID-19 information on social media. In addition, this study could serve as a basis for the development of awareness programs to improve students' engagement in controlling the spread of infectious diseases, including COVID-19. As well as integrating preventive health education into the formal curriculum.

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