

Knowledge level of healthcare professionals regarding hepatitis B immunization of newborns: example of Turkey

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SUMMARY

OBJECTIVE: The aim of this study was to evaluate healthcare professionals' knowledge level for hepatitis B immunization of term and preterm newborns. **METHODS:** The study was conducted with 213 midwives, nurses, and physicians between October 2021 and January 2022 in a province of Turkey. **RESULTS:** Participants had the least knowledge about the management of newborns with low birth weight born to hepatitis B-infected mothers (16%). **CONCLUSION:** The study revealed some knowledge gaps among healthcare professionals regarding hepatitis B immunization of newborns. **KEYWORDS:** Hepatitis B vaccines. Health knowledge, attitudes, practice. Infant, newborn. Immunization. Health personnel.

INTRODUCTION

It is estimated that 2 billion people have been exposed to the hepatitis B virus (HBV) and over 400 million chronic hepatitis B (HepB) infections worldwide. In a study conducted in Turkey, HBsAg positivity over 18 years old was 4%, and anti-HBc positivity was 31%¹. The most important route of transmission of HepB infection is from mother to baby.

The World Health Organization (WHO) has reported that it aims to reduce the prevalence of HBsAg below 0.1% by 2030. It is accepted that vaccination is the cornerstone of achieving this goal². The vaccine protects newborns born to HBsAg(+) mothers who were not screened before birth and who were not identified as HBsAg(+) due to test errors and delay³. Three doses of vaccine against HepB develop an adequate antibody response and protect for 20–30 years². In Turkey, the HepB vaccine entered the childhood vaccination calendar in 1998 and is administered in three doses. The rate of vaccination has increased gradually in our country, and the rate of vaccination, which was 64% in 1999, increased to 98% as of 2016. The incidence of HepB disease under the age of 5 years has decreased to less than 1/100,000. The HepB vaccination rate in Turkey is above the WHO standards⁴. It has been announced that the vaccination rate, which is 42% globally, is 4% in the African Region⁵. A study conducted in Vietnam showed that only 45.2% of newborns were vaccinated at birth within 24 h⁶. A study in Washington State reported that 75.5% of newborns

received the HepB vaccine while still in the hospital⁷. It has been reported that the HepB vaccine dose is 45% in India⁸.

A study from Turkey showed that HepB immunoglobulin (HBIG) and HepB vaccines were administered to all babies of mothers with positive HBsAg tests⁹. Healthcare professionals need a basic understanding of the subject to administer an effective vaccine and immunoglobulin. Evidence shows that vaccine and immunoglobulin administration is influenced by knowledge, attitude, and practice. However, there are few studies in this area. Some studies investigate the knowledge of healthcare professionals or students about the transmission and prevention of the disease and their HepB vaccination status^{10–13}. A study conducted in Sudan showed that midwives and nurses have moderate knowledge and safe practices about the HepB vaccine¹⁴. In Papua New Guinea and China, it has been reported that insufficient knowledge of the healthcare professionals is an obstacle to the birth dose vaccine¹⁵.

Moreover, in an African study with physicians and midwives in the eastern region of Ghana, participants had some knowledge gaps about HBIG¹⁶. A study in Saudi Arabia strangely revealed that some healthcare professionals did not know that the HepB vaccine should be given to newborn babies¹⁷. Papers on the immunization of newborns in Turkey are scarce⁹. For this reason, this study was planned to assess the gap in knowledge and the necessity for in-service training of healthcare professionals that are likely to do and give advice on newborn immunization.

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METHODS

Study design

The study was conducted as a cross-sectional, descriptive-correlational study. The research was conducted at public hospitals in a province of Turkey. The participants of the study consisted of 213 midwives, nurses, and doctors.

Data collection

Data were collected between October 2021 and January 2022. An anonymous self-administered questionnaire was used. A study form was provided to those who accepted to participate.

Data analyses

Statistical evaluation was performed via IBM SPSS 20.0 package program. The data were analyzed using chi-square test, $p < 0.05$.

Ethical considerations

Ethics committee approval (approval no.: 2021/107) and official permission from the hospital were obtained before starting the study. We informed and interviewed healthcare professionals on the first page of the questionnaire and included information about the aim and content of this study. This study has been conducted in accordance with the principles set forth in the Declaration of Helsinki.

RESULTS

The study was completed with 94% of the participants: 32.4% were midwives, 42.7% were nurses, and 24.5% were doctors. Most participants were between the ages of 28–37 years; 59.2% were undergraduates, 65.7% were married, and 55.9% had an experience of 0–10 years. More than half of the healthcare professionals received in-service training for the HepB immunization after graduation, 53.5% reported that they needed in-service training for the HepB immunization, 69.5% administered the HepB vaccine, and 60.1% administered HBIG.

Almost all (93.9%) of the healthcare professionals, even those who had not received any education about hepatitis other than school education ($p = 0.014$), knew that the HepB vaccine was safe and effective in preventing the disease. Especially those aged 38 and over ($p = 0.042$) and those who did not apply the vaccine ($p = 0.011$) knew that the vaccine was more effective than cesarean section. Physicians ($p = 0.022$), postgraduate education ($p = 0.026$), and those who administered immunoglobulin ($p = 0.000$) knew that the vaccine dose should not be more than 1 mL. Healthcare professionals ($p = 0.004$) who received HepB education from school have more information about

the necessity of administering vaccines and immunoglobulins to babies of HepB-infected mothers. Those aged 28–37 years ($p = 0.004$), physicians ($p = 0.044$), those with postgraduate education ($p = 0.004$), those who were married ($p = 0.022$), and those who applied immunoglobulin ($p = 0.011$) had more knowledge.

Nurses ($p = 0.022$), those who need other HepB-related training ($p = 0.020$) and those who administered immunoglobulin ($p = 0.016$), stated that consent should be obtained before vaccination and immunoglobulin administration (Table 1).

Overall, 89.7% of the participants knew that newborns $\geq 2,000$ g and their HBsAg(-) mothers should be vaccinated within 24 h (within 72 h at the latest). Those who administer vaccines have more knowledge about these issues ($p = 0.036$). In all, 87.8% of the participants knew that newborns $\geq 2,000$ g and their HBsAg(+) mothers should be vaccinated within 12 h. Those who administer immunoglobulin have more knowledge about these issues ($p = 0.001$). Those who administered the vaccine ($p = 0.005$) were more aware that a newborn ≥ 2000 g born to an unknown HBsAg status mother should only be vaccinated within 12 h (Table 2).

Overall, 63.4% of the participants know that the vaccine dose should not be reduced if the birth weight of newborns is 2,000 g or less. Those who received HepB training other than school education ($p = 0.000$), those who administered vaccines ($p = 0.001$), and those who administered immunoglobulin ($p = 0.000$) had more knowledge on the subject. Those between the ages of 18 and 27 years ($p = 0.002$), those who have experience for 0–10 years ($p = 0.000$), and those who did not apply the vaccine ($p = 0.008$) did not know that newborns $\leq 2,000$ g born to HBsAg(+) mothers should be vaccinated and applied HBIG within first 12 h. Those between the ages of 18 and 27 years ($p = 0.027$), physicians ($p = 0.007$), postgraduate students ($p = 0.005$), those who worked between 0 and 10 years ($p = 0.007$), and those who administered immunoglobulin ($p = 0.000$) knew that a newborn $\leq 2,000$ g born to unknown HBsAg status should only be vaccinated within 12 h (Table 3).

DISCUSSION

In this study, less than half of the participants were knowledgeable of the characteristics that the effect of the HepB vaccine in preventing the disease was no inferior to that of cesarean section (38.0%), that HepB vaccine could be administered to low-birth-weight newborns (44.1%), and that the vaccine and HBIG should be administered to newborns $\leq 2,000$ g born to HBsAg(+) mothers within 12 h (16.0%).

Almost all (93.9%) healthcare professionals knew that the HepB vaccine was safe and effective in preventing the disease.

Table 1. General information of healthcare professionals about the HepB vaccine.

	HepB vaccine is safe and effective in preventing disease		The effect of the HepB vaccine in preventing the disease is no less than cesarean section		Vaccine dosage for the newborn		Both vaccine and HBIG should be administered to a newborn born to an HBsAg(+) mother		HepB vaccine and HBIG should not be administered to the same injection site		Informed consent of the mother should be obtained before administering the vaccine and HBIG	
	Knowing n (%)	p-value	Knowing n (%)	p-value	Knowing n (%)	p-value	Knowing n (%)	p-value	Knowing n (%)	p-value	Knowing n (%)	p-value
Profession												
Midwives	65 (94.2)		22 (31.9)	$\chi^2=0.317$ p>0.05	36 (52.2)	$\chi^2=0.022$ *p<0.05	63 (91.3)	$\chi^2=0.411$ p>0.05	52 (75.4)	$\chi^2=0.044$ *p<0.05	45 (65.2)	$\chi^2=0.022$ *p<0.05
Nurse	88 (96.7)	$\chi^2=0.787$ p>0.05	35 (38.5)		61 (67.0)		82 (90.1)		62 (68.1)		73 (80.2)	
Physician	47 (88.7)		24 (45.3)		40 (75.5)		51 (96.2)		46 (86.8)		32 (60.4)	
Age (years)												
18-27	46 (93.9)		13 (26.5)	$\chi^2=0.042$ *p<0.05	29 (59.2)	$\chi^2=0.736$ p>0.05	45 (91.8)	$\chi^2=0.793$ p>0.05	28 (57.1)	$\chi^2=0.004$ *p<0.05	36 (73.5)	$\chi^2=0.467$ p>0.05
28-37	94 (94.9)	$\chi^2=0.787$ p>0.05	36 (36.4)		65 (65.7)		90 (90.9)		80 (80.8)		72 (72.7)	
38 and older	60 (92.3)		32 (49.2)		43 (66.2)		61 (93.8)		52 (80.6)		42 (64.6)	
Education status												
Graduate	138 (95.2)		54 (37.2)	$\chi^2=0.601$ p>0.05	86 (59.3)	$\chi^2=0.026$ *p<0.05	130 (89.7)	$\chi^2=0.063$ p>0.05	101 (69.7)	$\chi^2=0.004$ *p<0.05	108 (74.5)	$\chi^2=0.590$ p>0.05
Postgraduate	62 (91.2)	$\chi^2=0.256$ p>0.05	27 (39.7)		51 (75.0)		66 (97.1)		59 (86.8)		42 (61.8)	
Marital status												
Married	133 (95.0)	$\chi^2=0.352$ p>0.05	55 (39.3)	$\chi^2=0.601$ p>0.05	90 (64.3)	$\chi^2=0.989$ p>0.05	132 (94.3)	$\chi^2=0.091$ p>0.05	112 (80.0)	$\chi^2=0.022$ *p<0.05	100 (71.4)	$\chi^2=0.590$ p>0.05
Single	67 (91.8)		26 (35.6)		47 (64.4)		64 (87.7)		48 (65.8)		50 (68.5)	
Experience												
0-10 years	110 (93.2)	$\chi^2=0.646$ p>0.05	41 (34.7)	$\chi^2=0.271$ p>0.05	77 (65.3)	$\chi^2=0.751$ p>0.05	106 (89.8)	$\chi^2=0.189$ p>0.05	84 (71.2)	$\chi^2=0.139$ p>0.05	89 (75.4)	$\chi^2=0.575$ p>0.05
>10 years	90 (94.7)		40 (42.1)		60 (63.2)		90 (94.7)		76 (80.0)		61 (64.2)	
Received training on HepB vaccine other than school education												
Yes	99 (90.0)	$\chi^2=0.014$ *p<0.05	46 (41.8)	$\chi^2=0.239$ p>0.05	71 (64.5)	$\chi^2=0.943$ p>0.05	107 (97.3)	$\chi^2=0.004$ *p<0.05	85 (77.3)	$\chi^2=0.452$ p>0.05	80 (72.7)	$\chi^2=0.446$ p>0.05
No	101 (98.1)		35 (34.0)		66 (64.1)		89 (86.4)		75 (72.8)		70 (68.0)	
Administration of vaccine												
Yes	137 (92.6)	$\chi^2=0.221$ p>0.05	48 (32.4)	$\chi^2=0.011$ *p<0.05	97 (65.5)	$\chi^2=0.575$ p>0.05	135 (91.2)	$\chi^2=0.514$ p>0.05	112 (75.7)	$\chi^2=0.776$ p>0.05	110 (74.3)	$\chi^2=0.060$ p>0.05
No	63 (96.9)		33 (50.8)		40 (61.5)		61 (93.8)		48 (73.8)		40 (61.5)	
Administration of HBIG												
Yes	118 (92.2)	$\chi^2=0.201$ p>0.05	44 (34.4)	$\chi^2=0.178$ p>0.05	97 (75.8)	$\chi^2=0.000$ *p<0.05	119 (93.0)	$\chi^2=0.530$ p>0.05	104 (81.2)	$\chi^2=0.011$ *p<0.05	98 (76.6)	$\chi^2=0.016$ *p<0.05
No	82 (96.5)		37 (43.5)		40 (47.1)		77 (90.6)		56 (65.9)		52 (61.2)	

*Bold values indicate statistical significance at the p<0.05 level.

Table 2. Knowledge level of healthcare professionals about HepB vaccine and immunoglobulin administration to above $\geq 2,000$ g weight newborns.

	Newborns $\geq 2,000$ g and born to HBsAg(-) mother should be vaccinated within 72 h		Vaccine and HBIG should be administered within 12 h to newborns $\geq 2,000$ g born to HBsAg(+) mother		A newborn $\geq 2,000$ g born to a mother with HBsAg status unknown should be vaccinated within 12 h	
	Knowing n (%)	p-value	Knowing n (%)	p-value	Knowing n (%)	p-value
Profession						
Midwives	61 (88.4)	$\chi^2=0.912$ p>0.05	61 (88.4)	$\chi^2=0.376$ p>0.05	51 (73.9)	$\chi^2=0.203$ p>0.05
Nurse	82 (90.1)		77 (84.6)		55 (60.4)	
Physician	48 (90.6)		49 (92.5)		35 (66.0)	
Age (years)						
18–27	46 (93.9)	$\chi^2=0.104$ p>0.05	43 (87.8)	$\chi^2=0.872$ p>0.05	31 (63.3)	$\chi^2=0.468$ p>0.05
28–37	91 (91.9)		88 (88.9)		65 (65.7)	
38 and older	54 (83.1)		56 (86.2)		45 (69.2)	
Education status						
Graduate	129 (89.0)	$\chi^2=0.621$ p>0.05	126 (86.9)	$\chi^2=0.559$ p>0.05	97 (66.9)	$\chi^2=0.753$ p>0.05
Postgraduate	62 (91.2)		61 (89.7)		44 (64.7)	
Marital status						
Married	125 (89.3)	$\chi^2=0.798$ p>0.05	126 (90.0)	$\chi^2=0.173$ p>0.05	92 (65.7)	$\chi^2=0.837$ p>0.05
Single	66 (90.4)		61 (83.6)		49 (67.1)	
Professional experience						
0–10 years	108 (91.5)	$\chi^2=0.322$ p>0.05	104 (88.1)	$\chi^2=0.865$ p>0.05	76 (64.4)	$\chi^2=0.538$ p>0.05
>10 years	83 (87.4)		83 (87.4)		65 (68.4)	
Received training on HepB vaccine other than school education						
Yes	98 (89.1)	$\chi^2=0.774$ p>0.05	100 (90.9)	$\chi^2=0.151$ p>0.05	77 (70.0)	$\chi^2=0.225$ p>0.05
No	93 (90.3)		87 (84.5)		64 (62.1)	
Administration of vaccine						
Yes	137 (92.6)	$\chi^2=0.036$ *p<0.05	134 (90.5)	$\chi^2=0.065$ p>0.05	107 (72.3)	$\chi^2=0.005$ *p<0.05
No	54 (83.1)		53 (81.5)		34 (52.3)	
Administration of HBIG						
Yes	120 (93.8)	$\chi^2=0.016$ *p<0.05	121 (94.5)	$\chi^2=0.001$ *p<0.05	91 (71.1)	$\chi^2=0.064$ p>0.05
No	71 (83.5)		66 (77.6)		50 (58.8)	

*Bold values indicate statistical significance at the p<0.05 level.

Contrary to the study findings in Vietnam, some medical students (61%) thought the HepB vaccine was safe¹⁰. Knowing that the HepB vaccine is safe and effective in our study may be because the study was conducted with professionals in practice and experience. It has been reported that the risk of HepB transmission from a HepB-infected mother to her baby does not differ according to the delivery method, whether vaginal or caesarian¹⁸. In addition, there is insufficient evidence that cesarean section does not prevent transmission and provides additional protection against HepB transmission compared to HepB immunoglobulin and vaccination^{18,19}. In this study, those aged 38 and over (p=0.042) and those who did not apply the

vaccine (p=0.011) knew that the vaccine was effective. It may be because the participants received adequate training on the subject during school education and did not need training, and some information was better comprehended as the age progressed. Having received training other than school education in our study made the participants more knowledgeable about administering both vaccine and HBIG to an HBsAg(+) newborn (p=0.004) and not reducing the vaccine dose for newborns born under $\leq 2,000$ g (p=0.000). This made us think that the education received after graduation is effective in comprehending information. In a study conducted in a city in the state of Amazonas, it was shown that, similar to the findings

Table 3. Knowledge level of healthcare professionals about HepB vaccine and immunoglobulin administration to under ≤2,000 g weight newborns.

	Vaccine dose should not be reduced		p	HBV vaccine should not be administered within 12 h to newborns ≤2,000 g born to HBsAg(-) mother		p-value	Vaccine and HBIG both should be administered within 12 h to newborns ≤2,000 g born to HBsAg(+) mother		p-value	A newborn who is ≤2,000 g born to a mother with an HBsAg status unknown should not be vaccinated within 12 h		p-value
	Knowing n (%)	Knowing n (%)		Knowing n (%)	Knowing n (%)		Knowing n (%)	Knowing n (%)		Knowing n (%)		
Profession												
Midwives	43 (62.3)	43 (62.3)	$\chi^2=0.638$ p>0.05	43 (62.3)	43 (62.3)	$\chi^2=0.638$ p>0.05	13 (18.8)	44 (63.8)	$\chi^2=0.638$ p>0.05	63 (69.2)	$\chi^2=0.007$ *p<0.05	
Nurse	56 (61.5)	65 (71.4)		65 (71.4)	16 (17.6)		63 (69.2)					
Physician	36 (67.9)	42 (79.2)		42 (79.2)			5 (9.4)	47 (88.7)				
Age (years)												
18-27	29 (59.2)	40 (81.6)	$\chi^2=0.590$ p>0.05	40 (81.6)	40 (81.6)	$\chi^2=0.040$ *p<0.05	3 (6.1)	39 (79.6)	$\chi^2=0.002$ *p<0.05	76 (76.8)	$\chi^2=0.027$ *p<0.05	
28-37	63 (63.6)	71 (71.7)		71 (71.7)	12 (12.1)		76 (76.8)					
38 and older	43 (66.2)	39 (60.0)		39 (60.0)	19 (29.2)		39 (60.0)					
Education status												
Graduate	91 (62.8)	97 (66.9)	$\chi^2=0.783$ p>0.05	97 (66.9)	97 (66.9)	$\chi^2=0.100$ p>0.05	26 (17.9)	95 (65.5)	$\chi^2=0.252$ p>0.05	59 (86.8)	$\chi^2=0.005$ *p<0.05	
Postgraduate	44 (64.7)	53 (77.9)		53 (77.9)	8 (11.8)		59 (86.8)					
Marital status												
Married	92 (65.7)	98 (70.0)	$\chi^2=0.327$ p>0.05	98 (70.0)	98 (70.0)	$\chi^2=0.852$ p>0.05	26 (18.6)	99 (70.7)	$\chi^2=0.150$ p>0.05	55 (75.3)	$\chi^2=0.474$ p>0.05	
Single	43 (58.9)	52 (71.2)		52 (71.2)	8 (11.0)		55 (75.3)					
Experience												
0-10 years	75 (63.6)	92 (78.0)	$\chi^2=0.952$ p>0.05	92 (78.0)	92 (78.0)	$\chi^2=0.007$ *p<0.05	10 (8.5)	94 (79.7)	$\chi^2=0.000$ *p<0.05	60 (63.2)	$\chi^2=0.007$ *p<0.05	
>10 years	60 (63.2)	58 (61.1)		58 (61.1)	24 (25.3)		60 (63.2)					
Received training on HepB vaccine other than school education												
Yes	83 (75.5)	78 (70.9)	$\chi^2=0.000$ *p<0.05	78 (70.9)	78 (70.9)	$\chi^2=0.872$ p>0.05	18 (16.4)	80 (72.7)	$\chi^2=0.869$ p>0.05	74 (71.8)	$\chi^2=0.886$ p>0.05	
No	52 (50.5)	72 (69.9)		72 (69.9)	16 (15.5)		74 (71.8)					
Administration of vaccine												
Yes	105 (70.9)	102 (68.9)	$\chi^2=0.001$ *p<0.05	102 (68.9)	102 (68.9)	$\chi^2=0.468$ p>0.05	30 (20.3)	108 (73.0)	$\chi^2=0.008$ *p<0.05	46 (70.8)	$\chi^2=0.741$ p>0.05	
No	30 (46.2)	48 (73.8)		48 (73.8)	4 (6.2)		46 (70.8)					
Administration of HBIG												
Yes	96 (75.0)	98 (76.6)	$\chi^2=0.000$ *p<0.05	98 (76.6)	98 (76.6)	$\chi^2=0.025$ *p<0.05	21 (16.4)	105 (82.0)	$\chi^2=0.828$ p>0.05	49 (57.6)	$\chi^2=0.000$ *p<0.05	
No	39 (45.9)	52 (61.2)		52 (61.2)	13 (15.3)		49 (57.6)					

*Bold values indicate statistical significance at the p<0.05 level.

of our study, the knowledge, attitudes, and practices of physicians and nurses about the vertical transmission of HepB increased with postgraduate education²⁰. In this study, doctors had more knowledge of the vaccine dose to be administered to newborns ($p=0.022$), that the HepB vaccine and HBIG should not be administered to the same injection site at the same time ($p=0.044$), and that newborns $\leq 2,000$ g born to mothers with HBsAg status unknown should not be only vaccinated within 12 h ($p=0.007$). The reason physicians are more knowledgeable compared to the other professions may be that more than half (62.3%) of the physicians have received training on the HepB vaccine other than school education, very few (28.3%) need training on the subject, and more than half (62%) of the postpartum care of babies is performed by physicians²¹. Unlike the study results in Khartoum, Sudan, two-thirds of nurses and midwives had a safe practice of HepB vaccine¹⁴. It may be due to the different education systems. Nurses were more knowledgeable about the need to obtain informed consent from the mother before administering only the HepB vaccine and HBIG ($p=0.022$). WHO recommends obtaining verbal consent from the mother before administering the HepB vaccine¹⁸. In our findings, it is a positive feature that nurses consider it necessary to obtain informed consent from the mother before administering vaccine and immunoglobulin. Administering the immunoglobulin and vaccine has made healthcare professionals more knowledgeable about some issues. Healthcare professionals with direct hands-on care experience are expected to have good practices²². In this study, the knowledge of the proper education by those who administered the vaccine and immune globulin may be due to the understanding of the correct information by practice.

In this study, the participants who did not apply the vaccine did not know that the vaccine and HBIG should be administered within 12 h to newborns $\leq 2,000$ g born to HBsAg(+) mothers. Similar to the findings of the Ghana study, 12.7%

of the participants knew that there was a vaccine that could prevent the transmission of HepB infection from mother to newborn when administered with HBIG to newborns born to mothers infected with HepB¹⁶. The lack of information in our study may be because healthcare professionals mostly care for newborns with average weight. In a study conducted in Turkey, babies' birth weight (92.3%) was more than 2,500 g²³. Healthcare professionals who lack knowledge about newborn immunization may miss vaccination opportunities. Therefore, improving the education and training of health workers is critical. Evaluations of hospitals in Papua New Guinea and peripheral health facilities in China have reported that insufficient knowledge among medical staff is an obstacle to timely and correct dose administration of vaccines. In the study evaluating the impact of medical staff training in the Philippines, it was seen that the coverage of the birth dose increased from 19 to 74% within 2 months of the training, and attention was drawn to the effect of the training. Similarly, in the Chinese province of Qinghai, it has been reported that the rate of term delivery increased from 40 to 70% with the training of healthcare workers¹⁵.

CONCLUSION

This study points out a lack of knowledge among midwives, nurses, and physicians about the immunization of some newborns and that some newborns may be exposed to the risk of transmission of HepB from their mother. It may be recommended to provide education to healthcare professionals about vaccines and immunoglobulins.

AUTHORS' CONTRIBUTIONS

PS: Conceptualization, Writing – original draft, Writing – review & editing. **KD:** Investigation, Writing – review & editing.

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