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Parental knowledge of RSV infection and attitude to infant immunization with monoclonal antibodies in western region, Saudi Arabia

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ABSTRACT

Background

Human Respiratory Syncytial Virus (RSV) is a single-stranded (RNA) virus belongs to genus orthopneumovirus. It accounted as one of the main causes of lower respiratory tract infection in the pediatric age group and associated with their hospitalization and morbidity. Prophylactic monoclonal antibodies help in improvement and reduction of the serious complications resulting from the virus

Objective

The aim of this paper is to assess parental knowledge of RSV infection and attitudes to infant immunization with monoclonal antibodies.

Method

A cross-sectional study conducted using online questionnaire from February 2023 to June 2023 in western region in the Kingdom of Saudi Arabia. A total of 606 of participants, which include any parents or caregiver who believe in childhood vaccination in western region of Saudi Arabia with exclusion of any parents who hesitate towards or refuse childhood vaccinations and outside western region. The statistical analysis done using IBM SPSS

Results

The study included 606 participants from the western province of Saudi Arabia, 218 (36 Per Cent) were in the age group of 20-30 years, 383 (63.2 Per Cent) had bachelor degrees And 77(12.7) works in healthcare, RSV was the least known childhood infectious agent (48.7 Per Cent) of the participants never heard of it. 542 (89.4 Per Cent) had a positive attitude toward childhood vaccinations in general and (51.2 Per Cent) toward RSV vaccination with (75.2 Per Cent) concerned about its safety

Conclusion

Despite the fact that practically all children were exposed to RSV, a sizable percentage of parents never heard of it. We propose that dependable healthcare professionals provide evidence-based information regarding RSV and its safety, effectiveness, and duration of protection against RSV for parents.

Key Words

Knowledge, Attitude, RSV, Respiratory syncytial virus, Bronchiolitis, Palivizumab, Monoclonal antibody.

Introduction

Human Respiratory Syncytial Virus (RSV) is a single-stranded (RNA) virus belonging to genus orthopneumovirus, a highly contagious viral pathogen and a member of Pneumoviridae family that was initially known as “chimpanzee coryza

Agent" (ccA)[1]. This is since it was first discovered in the nasal secretions of chimpanzees with rhinorrhea and coryza in 1956[2]. The virus was considered as one of the main acute respiratory infection etiological agents that cause pediatric Acute Lower Respiratory Infections (ALRI) and Upper Respiratory Infections (URI)[3]. In 1957, it was isolated from infants with acute lower respiratory tract infection, and derived its name from the syncytia observed under an electron microscope [4]. Almost all children face RSV infection by the time they are 2 years old, adding to this, in the first year of life, 20 Per Cent of all babies develop lower respiratory tract illness associated with RSV[5]. In infants and young children, bronchiolitis and pneumonia are most frequently caused by the RSV, which is also related to childhood morbidity[6].

Considering the young age and concerns about the immune response of the target population, there is currently no licensed vaccine available to prevent RSV infection in infants; although, for now, the main treatment for RSV is supportive treatment[7]. Therefore, the best way to control RSV infection is through prophylaxis[8]. Furthermore, immunizing pregnant mothers is a potential strategy to prevent severe RSV disease in early infancy[9]. As of today, Palivizumab is the only approved immunoprophylaxis by the Food and Drug Administration for the reduction of serious lower respiratory tract infection caused by RSV in specific high-risk infants[10]. "Palivizumab is a humanized IgG1κ monoclonal antibody and has strong neutralizing activity against both A and B strains of RSV[11 ,12]. Monthly doses should be administered during the RSV season (September to March) to infants who are eligible for prophylaxis during the first year of life. In 2014, American Academy of Pediatrics guidelines limits RSV immunoprophylaxis to premature infants born at <29 weeks of gestational age, infants <32 weeks of gestational age with Chronic Lung Disease (CLD), and infants <12 months with Chronic Heart Disease (CHD)[13]. The effectiveness of palivizumab in decreasing the overall hospitalization rates, duration, and the use of supplementary oxygen, is supported by two randomized placebo-controlled clinical trials[14, 15].

A cross-sectional study measured the parents' knowledge regarding RSV and their attitude toward immunization with monoclonal antibodies, showed that only 35 Per Cent out of 5627 parents had a good level of knowledge about RSV[16]. We are aware that parents' perspectives about childhood illnesses and vaccination in general, influence their attitudes toward the immunization of their children. Therefore, when the other study evaluated the knowledge of 583 parents of preterm infants' about RSV and other respiratory infections, only 19.7 Per Cent of these valuations were marked as poor or no knowledge [17]. To our knowledge, no prior published studies in Saudi Arabia had analyzed parents' knowledge and attitude toward RSV and infant immunization.

Thus, this paper aims to assess parental knowledge of RSV infection and attitudes toward infant immunization with monoclonal antibodies.

Materials and Methods

Study design and setting

The study is a population-based, cross-sectional study with approval from the Research and Ethics Committee of Taif University, was conducted in the western region of Saudi Arabia, among parents of infants and children in February 2023. The study population included parents who believe in childhood vaccination and who have children aged less than 18 years living in the western region.

Study population

Parents of children who resided within Saudi Arabia's western region represented the target population. Saudi Arabia's western region, known as Al Hejaz, consists of 16 governorates, including Taif, Mecca, Jeddah, Medina and Yanbu.

All parents in Saudi Arabia's western region who have children under the age of 18 were included in the study. Parents who lived outside the western region and those whose children were older than 18 years of age were excluded from the study.

Sample size

The sample size of this study was calculated using the following formula:

$n = z2(1 - p)/d2.$

Where, n is the sample size, z is the statistic for a level of confidence (1.96 Per Cent to 95 Per Cent confidence level), p is the anticipated population proportion (50 Per Cent) for the largest sample size, and d is precision (0.05 [5 Per Cent]).

The estimated sample size was 385; however, we increased it to 606.

Tools of data collection

We used an online prevalidated reported anonymous Arabic survey from a previous study by Lee Mortensen, G16.

The survey (appendices) was divided into five sections, a group of data collectors distributing the questionnaire via social media platforms. The first and second part of the

survey was about participant consent and sociodemographic data. The third section included six questions about the participants' background (number of kids, birth of children, diagnosis of CLD of prematurity or CHD[congenital heart disease] or down syndrome, necessary vaccination), and the fourth section contained questions about awareness and knowledge about RSV. The last section assessed the attitudes toward RSV immunization with monoclonal antibodies (mAbs).

The ethical approval number 44-151 obtained from The ethics committee at Taif University ,The committee is accredited by the National Committee for Bioethics with No. (HAO-02-T-105)

Statistical analysis

The data from the questionnaire were entered into a database (Microsoft Excel for Mac, version 16.32) and then were analyzed using SPSS version 23 (IBM Corp. Chicago, IL, USA). The data analysis was carried out by an independent biostatistician. With categorical variables presented as frequencies and percentages, continuous variables were expressed using mean and standard deviations. Pearson's Chi-square test was used to evaluate the statistical relationship between categorical variables. A p-value of ≤0.05 was considered statistically significant.

Results

The survey analysis included responses from 606 participants from the western province of Saudi Arabia. The sociodemographic characteristics showed that 433 (71.5 Per Cent) were females: 168 (27.7 Per Cent) from Taif, 218 (36 Per Cent) belonged to the age group of 20–30 years, 383 (63.2 Per Cent) had bachelor degrees, 77 (12.7 Per Cent) were in the health care sector. The family characteristics of the participants showed that 286 (47.2 Per Cent) had 1–2 kids, 428 (70.6 Per Cent) had a birth at the due date, 69 (11.4 Per Cent) of them had a child suffering from at least one of the diseases such as Chronic Lung Disease of prematurity (CLD), Congenital Heart Disease (CHD), or down syndrome Table 1.

It was reported by 542 (89.4 Per Cent) of the participants that they agreed to give their child the necessary vaccinations authorized by the Ministry of Health, with the majority of the participants (83.2 Per Cent) reporting that their child/children received all recommended infant immunizations in the routine immunization program that was available to them to date, and a majority of them (91.1 Per Cent) receiving it on time Table 2.

The relationship between practices related to childhood immunization and sociodemographic characteristics is given in Table 3.

The gender of the participants didn't show any association with practice related to childhood immunization and sociodemographic characteristics ($p > 0.05$). The refusal to give children the necessary vaccinations authorized by the Ministry of Health was observed to be significantly higher in the age group of 20–30 years ($p = 0.019$) and also among those who had postgraduate degrees($p = 0.007$).

The self-reported knowledge about common childhood diseases among the participants is given in [Figure 1]. We found that RSV was the most common childhood infectious agent that was never heard by the participants (48.7 Per Cent), followed by Roseola (42.1 Per Cent) and Bronchiolitis (22.4 Per Cent). Influenza was the disease that was frequently reported by the participants with a good knowledge level, which was followed by Strep throat (79.7 Per Cent), Gastroenteritis (74.1 Per Cent), pneumonia (39.8 Per Cent), and lower respiratory tract infection (25.4 Per Cent).

The assessment of severity and concerns about RSV and bronchiolitis were recorded using a 7-point Likert scale [Figure 2]. The mean score for estimation of the severity of infant(s) who get bronchiolitis and RSV was found to be 3.04 ± 1.7 and 3.21 ± 1.9, respectively. The mean score for the level of concern about children getting RSV was found to be 4.42 ± 2.1, where 24.9 Per Cent were very highly concerned. In participants who reported that their child/children were diagnosed with RSV and/or bronchiolitis, the mean score of being well-informed about the disease was found to be 1.33 ± 2.0, where 20.3 Per Cent were not at all satisfied with the information. Regarding the estimated benefit of this RSV immunization to the infant/child, the mean score was found to be very high (4.96 ± 2.1), where 41.4 Per Cent of children perceived very high benefits.

The likelihood of accepting RSV immunization for their child or children if recommended as part of the childhood immunization program and by the child's HCP, neonatal, or pediatrician was recorded on a 10-point scale. The mean score was found to be 5.9 ± 3.3 [Figure 3].

It was reported by 334 (55.1 Per Cent) participants that one or more of their children had RSV and/or bronchiolitis, among which 34.4 Per Cent of them received the diagnosis and/or treatment at the emergency room, 24.3 Per Cent at the neonatal or special care baby unit, 17.7 Per Cent at the primary care center, and 12.3 Per Cent at Regular childrens

hospital. The assessment of concern of different aspects of RSV showed that 19.6 Per Cent were not concerned at all. By contrast, the most common concern reported by the participants was the severity of RSV (44.7 Per Cent) followed by spread and transmission of RSV (35.5 Per Cent); the high prevalence of RSV in infants (27.7 Per Cent), limited prevention options (24.8 Per Cent), and limited treatment options (21.5 Per Cent). About 17.3 Per Cent had no concerns regarding the impacts/symptoms of RSV. Concurrently, the most commonly reported concern regarding the impacts and symptoms of RSV by participants is breathing difficulties (51.3 Per Cent), followed by the need for medical intervention to regulate breathing (35.1 Per Cent), risk of hospitalization (34.3 Per Cent), risk of acute lower respiratory tract infection primarily bronchiolitis and pneumonia (33.3 Per Cent) and decrease in appetite (20.1 Per Cent). Where the most commonly reported reason to accept RSV immunization was "to protect infant at an age where they are most susceptible to RSV" (45.5 Per Cent), the most commonly cited important information about RSV vaccination was safety (75 Per Cent), followed by efficacy (39.8 Per Cent) and the least reported was cost (11.4 Per Cent). The most commonly reported reason not to accept RSV immunization was lack of knowledge regarding the immunization (22.3 Per Cent), followed by lack of knowledge regarding RSV (9.7 Per Cent) and concern and worry about effectiveness of RSV immunization (8.6 Per Cent) [Table 4].

The assessment of attitudes toward RSV immunization is given in [Table 5], with 51.2 Per Cent of participants reporting that they would wait for RSV immunization if recommended by their HCP. It was further found that 48.8 Per Cent of the participants reported that they would proactively ask an HCP about the immunization, 49.8 Per Cent of the participants reported that they would accept RSV immunization even if not included in the immunization program, and the remaining (50.2 Per Cent) reported that they would accept it only if included in the program. About 45.4 Per Cent of the participants mentioned that they wanted RSV immunization for infants as soon as possible, while the remaining 54.8 Per Cent were reluctant or hesitant toward obtaining the immunization of their infants. The most commonly preferred sources of information about RSV immunization were Health care workers (68.8 Per Cent), followed by health websites (11.6 Per Cent), and friends and family (7.3 Per Cent). The most preferred time of information about RSV immunization was during follow-up appointments on infants' health status (46.5 Per Cent), followed by the prenatal period (20.1 Per Cent) and when trying to conceive (17.3 Per Cent).

There was insignificant statistical association between the assessment of relationship between previous experience of RSV or bronchiolitis and acceptance of RSV immunization ($p = 0.677$) [Table 6].

There were statistically insignificant differences observed between educational level of the parents and hesitance toward the RSV vaccine ($p = 0.400$) [Table 7].

Finally, statistically insignificant association was observed between parents occupation status and acceptance of vaccine on time ($p = 0.593$)

Discussion

Human RSV is one of the main acute respiratory infection etiological agents that cause pediatric ALRI and upper respiratory infections (URI). The purpose of this study was to gain better understanding about parental knowledge and attitude regarding RSV and its immunization, taking into account that many studies have shown the high prevalence of RSV infection among children and its burden on their health[18-21].

Our findings highlight that approximately half of the participants had never heard about the RSV. Consequently, the most commonly reported reason not to accept RSV immunization was lack of knowledge regarding RSV immunization, followed by lack of knowledge regarding RSV. The severity of the virus and its spread and transmission were the most commonly reported concerns of the participants, by approximately more than one third of the participants. The mean score estimated benefit of the RSV immunization to infants or children was found to be very high, at 41.4 Per Cent recognizing very high benefits.

Lack of knowledge in the majority of parents in our study is consistent with the study by Lee Mortensen, G.; Harrod-Lui, K (2022). In our view, the most compelling explanation for this finding is that some of the health physicians mention the name of the virus when the child is infected with a viral infection or LRTI.

Many studies display that prematurity, CLD, CHD, and immune deficiency are all considered factors increasing the possibility of getting infected with RSV,which is a finding supported by a majority of participants who have infants or children with previous risk factors having a good to moderate level of knowledge in addition to prior infections with RSV [22,24]. A study done by Bracht, M.,et al (2021), found

that most of the parents with preterm infants had heard about RSV, which is consistent with previous statements.

More than half prefer to be informed about RSV and its immunization by health care workers such as GPs, pediatricians, or nurses. This is consistent with the study by Jing Xu (2006), which also shows that nurses are the primary source of information[25]. This result highlights the role of physicians in parental awareness as they are trusted.

The above findings emphasize that the health status of the child, the presence of any risk factors, and getting informed about RSV and its severity by health sector practitioners are the main factors related to the awareness of parents.

While the majority of the participants were willing to give their children the necessary vaccinations authorized by the Ministry of Health, there were some participants who refused to give their children the authorized vaccines.

Vaccine refusal is not an unfamiliar behavior. According to Wolfe and Sharp et al (2006) concern about vaccination arose early on, after the introduction of smallpox immunization and has been persistent since [26]. Fortunately, the public attitude in KSA toward children vaccinations authorized by the Ministry of Health was positive even during the COVID-19 pandemic despite the global fear, with 59 Per Cent of caregivers agreeing that routine childhood immunizations must be administered on time[27].

According to our findings the most important characteristic for the participants to accept the vaccine was its safety, with most of the caregivers choosing vaccine safety as the most common reason to accept the vaccine. This result is in line with previous researchers that found that one of the barriers to vaccination is the fear of its unsafety, vaccine-hesitant parents being more likely to believe that vaccines are unsafe, according to surveys and interviews [28].

It is interesting that the vaccine refusal was markedly higher in young parents and parents with a high level of education, we believe that this is due to misleading information or beliefs as the relation between vaccines and autism, and many other factors according to a study conducted in 2017. Some parent's reasons against vaccination included their child's young age, vaccine side effects, and illness strengthens the child's immune system [29].

This pattern of results is consistent with previous studies that have shown a correlation between level of education and vaccine refusal or hesitancy[30]. Taken together, it indicates that new vaccines are more likely to face vaccine hesitancy.

Parents who learned about RSV and bronchiolitis after their child was diagnosed were less concerned about it compared to parents who had limited knowledge about RSV, with parents who had heard of RSV being more concerned about its severity. The symptom that worried these parents the most was breathing difficulties. This suggests that parents who are aware of the symptoms of RSV have enough knowledge and are less concerned about it compared to parents who have limited knowledge about RSV. The results suggest that parents need information about RSV before their baby is born so that they can make an informed decision about RSV immunization before their baby's first RSV season, this pattern of results is consistent with the previous literature were awareness of RSV and bronchiolitis was higher in experienced than in new parents.

Results

Our results imply that half of the Participants will wait for RSV immunization to be recommended by an HCP and made mandatory in the childhood immunization program. Healthcare workers were found to be the most frequently favored sources of information regarding RSV immunization. In a pattern of results that is consistent with previous literature these findings emphasize the influence of health care personnel have on parental awareness and willingness to receive childhood vaccines. At the same time, the main driver for vaccination for most parents is the mandatory nature of the vaccination programs.

The primary justification for accepting RSV immunization, as previously reported, was the desire to protect the infants during the RSV season, with many parents saying that they wanted RSV immunizations for their infants as soon as possible. However, more than half of the respondents expressed some degree of hesitation toward the RSV vaccination. The common reasons for hesitation were a lack of knowledge regarding RSV immunization, followed by a lack of knowledge regarding RSV infection. It is crucial to address these issues to improve the public acceptance of the RSV vaccine.

Most parents favor obtaining knowledge regarding RSV vaccination during the well-child appointment rather than during perinatal visits. Likewise, as per the finding presented by Mortensen and Harrod-Lui, it is important for parents to have a thorough understanding of RSV and its vaccination before childbirth and during the first well-child appointments to make an informed decision.

This study's major flaw is the use of a self-reported questionnaire to collect data that was prone to recall bias.

Conclusion

Although almost all children are exposed to RSV by the age of 2, we found that, out of the common childhood illnesses that the participants had never heard of, RSV took the first place. When asked about RSV immunization, parental acceptance was based on immunization safety, and the main reason for reluctance being the lack of knowledge about immunization. Therefore, we suggest that both parents need evidence-based information from reliable health care workers about RSV and about the immunization safety, efficacy, and duration of protection against RSV, along with the Ministry of Health-approved immunization, which is critical for parental acceptance.

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AUTHOR CONTRIBUTIONS

A.A.A, R.A.A, R.M.A, R.F.A, M.H and G.A: Conceptualization, methodology and writing—original draft preparation. G.A and M.A; writing- review& editing, supervesin, formal anaysis S.T, A.K, A.S.A and S.A; writing- review& editing and formal anaysis. All authors have read and agreed to the published version of the manuscript.

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INSTITUTIONAL REVIEW BOARD STATEMENT

The study was approved by the Ethics Committee of Taif University (No. 44-151) from January 2023 to January 2024.

INFORMED CONSENT STATEMENT

Informed consent was obtained from all subjects involved in the study at the beginning of the questionnaire.

DATA AVAILABILITY STATEMENT

The datasets used and/ or analyzed during current study are available from the corresponding authors upon reasonable request.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

Tables and Figures

Table 1: Sociodemographic details

		N	Per Cent
Gender	Female	433	71.5
	Male	173	28.5
Province	Al-madina	92	15.2
	Jeddah	161	26.6
	Makkah	138	22.8
	Taif	168	27.7
	Yanbu	47	7.8
Age	20-30	218	36
	31-40	160	26.4
	41-50	142	23.4
	>50	86	14.2
Educational level	High school	128	21.1
	Undergraduate degree	383	63.2
	Postgraduate degree	95	15.7
Working status	Employee (outside health care)	255	42.1
	Health care employee	77	12.7
	Unemployed	274	45.2
Number of kids	2-Jan	286	47.2
	4-Mar	185	30.5
	>4	135	22.3
Birth of infant child/children	At due date	428	70.6
	Weeks before/after due date	178	29.4
Chronic lung disease of prematurity (CLD), congenital heart disease (CHD), or downs syndrome	No	537	88.6
	Yes	69	11.4

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Table 2: Practices and attitudes towards vaccination.

Refuse giving your child the necessary vaccinations authorized by the Ministry of Health	No	542	89.4
	Yes	64	10.6
Child/children received the recommended immunizations in the routine immunization program that have been available to them so far	All recommended infant immunizations	504	83.2
	Most (more than half) of the recommended infant immunizations	56	9.2
	My infant child is not yet old enough to have any immunizations	14	2.3
	Some (half or fewer) of the recommended infant immunizations	32	5.3
Did your child get these vaccinations on time	No	54	8.9

	Yes	552	91.1

Table 3: Treatment, management, complications, and outcome among hospital-admitted COVID-19 patients on admission.

		Refuse giving your child the necessary vaccinations authorized by the Ministry of Health			Child/children received the recommended immunizations in the routine immun program that have been available to them so far
		No	Yes	P value	All recommended infant immunizations
Gender	Female	390	43	0.424	
		90.10 Per Cent	9.90 Per Cent		
	Male	152	21		
		87.90 Per Cent	12.10 Per Cent		
Age	20-30	186	32	0.019	
		85.30 Per Cent	14.70 Per Cent		
	31-40	143	17		
		89.40 Per Cent	10.60 Per Cent		
	41-50	136	6		
		95.80 Per Cent	4.20 Per Cent		
	>50	77	9		
		89.50 Per Cent	10.50 Per Cent		
Educational level	High school	108	20	0.007	

		84.40 Per Cent	15.60 Per Cent		
	Undergraduate degree	354	29		
		92.40 Per Cent	7.60 Per Cent		
	Postgraduate degree	80	15		
		84.20 Per Cent	15.80 Per Cent		
Working status	Non-health sector	235	20	0.177	
		92.20 Per Cent	7.80 Per Cent		
	Health care sector	67	10		
		87.00 Per Cent	13.00 Per Cent		
	Unemployed	240	34		
		87.60 Per Cent	12.40 Per Cent		
Number of kids	2-Jan	253	33	0.718	
		88.50 Per Cent	11.50 Per Cent		
	4-Mar	168	17		
		90.80 Per Cent	9.20 Per Cent		
	>4	121	14		
		89.60 Per Cent	10.40 Per Cent		

Table 4: Experiences and concerns about RSV.

		N	Per Cent
One or more of your children had RSV and/or bronchiolitis	No	272	44.9
	Yes	334	55.1
Where did the child receive the diagnosis and/or treatment	Emergency room	115	34.4
(n=334)	Neonatal or special care baby unit	81	24.3
	Primary care center	59	17.7
	Regular children hospital	41	12.3
	Other	38	11.4
Concerned aspects of RSV	No concern	119	19.6
	Limited treatment options	130	21.5
	Limited prevention options	150	24.8
	The spread and transmission of RSV	216	35.6
	The high prevalence in infants	168	27.7
	Severity of RSV	271	44.7
Concerned Impacts/symptoms of RSV	No concern	105	17.3
	Breathing difficulties	311	51.3
	Cough	158	26.1
	Congestion	116	19.1
	Need for medical intervention to regulate breathing	213	35.1
	Risk of acute Lower respiratory tract infection (LRTI)	202	33.3
	Primarily bronchiolitis and pneumonia	202	33.3
	Risk of hospitalization	208	34.3
	Decrease in appetite	122	20.1

Information about RSV vaccine seems to important	Efficacy	241	39.8
	Durability	100	16.5
	Safety	456	75.2
	RSV disease	102	16.8
	Cost	69	11.4
Main reasons to accept RSV immunization	Had worrying experiences with RSV myself, in my family or among friends	6	1
	I believe it is important to protect my child against RSV	112	18.5
	It is shown to be safe / have few adverse reactions	17	2.8
	I do not agree to accept this vaccination	47	7.8
	I might regret not immunizing my child, if he/she later gets RSV	59	9.7
	I want to protect my infant at an age where they are most susceptible to RSV	276	45.5
	It is shown to be effective	24	4
	my child is at risk of contracting RSV	8	1.3
	My child is protected for the RSV season (5 months)	7	1.2
	RSV is a severe diseases	22	3.6
	Other (not mentioned above)	28	4.6
Main reasons to be hesitant towards RSV immunization	i am not worried	263	43.4
	I do not think it is important to protect against RSV	7	1.2
	Lack of knowledge regarding RSV	59	9.7
	Lack of knowledge regarding RSV immunization	135	22.3
	The risk of my infant child getting RSV is low	6	1
	The risk of my infant child getting severe RSV is low	14	2.3

	Length of protection	21	3.5
	Concern and worry about effectiveness	52	8.6
	There are already too many childhood immunizations	27	4.5
	Other (not mentioned above)	22	3.6

Table 5: Table 5: Attitudes toward RSV immunization.

		N	Per Cent
Demand of RSV immunization	Proactively asking an HCP about it	296	48.8
	Waiting for RSV immunization to be recommended by an HCP	310	51.2
	Acceptance of RSV immunization even if not included in the immunization program	302	49.8
Acceptance of RSV immunization	Acceptance of RSV immunization only if included in the immunization program	304	50.2
Need of RSV immunization	Want RSV immunization for infant as soon as possible	275	45.4
	Hesitance towards a new immunization	331	54.6
	Health care workers	417	68.8
	Health website	70	11.6
Preferred sources of information about RSV immunization	General information Websites	29	4.8
	Articles on journals and magazines	11	1.8
	Books	12	2
	Friends and family	44	7.3
	Social media	23	3.8
Preferred time of information about RSV immunization	Pre-natal	122	20.1
	During follow-up appointments on your infant's health status	282	46.5

	Right after delivery	97	16
	When trying to conceive	105	17.3

Table 6: Relationship between previous experience of RSV and/or bronchiolitis and Acceptance of RSV immunization

One or more of your children had RSV and/or bronchiolitis						
			No	Yes	Total	P value
Acceptance of RSV immunization	Acceptance of RSV immunization even if not included in the immunization program	N	133	169	302	0.677
		Per Cent	44.00 Per Cent	56.00 Per Cent	100.00 Per Cent	
	Acceptance of RSV immunization only if included in the immunization program	N	139	165	304	
		Per Cent	45.70 Per Cent	54.30 Per Cent	100.00 Per Cent	

Table 7: Parents educational level and hesitancy towards vaccination.

			High school	Undergraduate degree (Bachelor, diploma)	Postgraduate degree	Total	P value
Need for RSV immunization	Wanting it for your infant as soon	N	53	174	48	275	0.4
		Per Cent	19.30 Per Cent	63.30 Per Cent	17.50 Per Cent	100.00 Per Cent	
	Hesitance towards a new immunization	N	75	209	47	331	
		Per Cent	22.70 Per Cent	63.10 Per Cent	14.20 Per Cent	100.00 Per Cent	

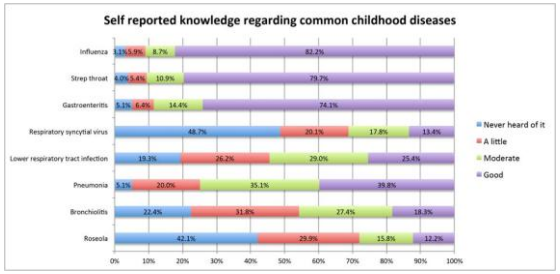

Figure 1: The assessment of severity and concerns about RSV and bronchiolitis were recorded using a 7-point Likert scale.

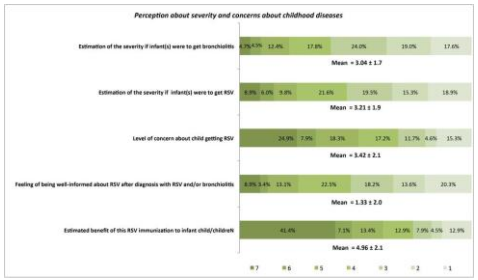

Figure 2: The mean score for estimation of the severity of infant(s) who get bronchiolitis.

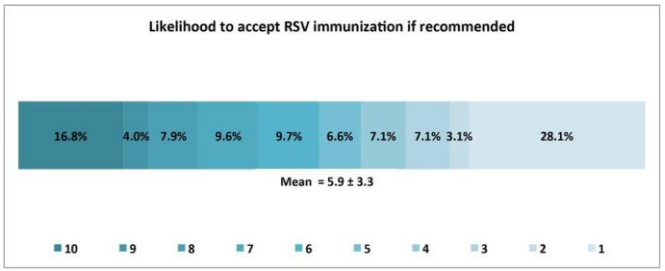

Figure 3: The likelihood of accepting RSV immunization for their child or children if recommended as part of the childhood immunization program and by the child's HCP, neonatal, or pediatrician was recorded on a 10-point scale.

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Parental knowledge of RSV infection and attitude to infant immunization with monoclonal antibodies in western region, Saudi Arabia

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Appendix A

A-demographic data

Gender:
Female
Male
City
Taif
Makkah
Jeddah
Al-madina
Yanbu
Age
20-30 years old
31-40 years old
41-50 years old
51 years or older
Educational level:
High school
Undergraduate degree (Bachelor, diploma)
Postgraduate degree
Working status
Unemployed
Health care employee
Employee (outside health care)

B-background questions

Number of kids:

1-2 kids
3-4 kids
More than 4 kids
Birth of infant child/children
at due date
weeks before/after due date

Has your child been diagnosed with chronic lung disease of prematurity (CLD), congenital heart disease (CHD), or downs syndrome?

Yes
No

Do you refuse giving your child the necessary vaccinations authorized by the Ministry of Health?

Yes
No

To what extent, if at all, has your infant child/children received the recommended immunizations in the routine immunization programme that have been available to them so far?

All recommended infant immunizations
Most (more than half) of the recommended infant immunizations
Some (half or fewer) of the recommended infant immunizations
My infant child is not yet old enough to have any immunizations.

Did your child get these vaccinations on time?

Yes
No

C- Awareness and knowledge about RSV

Familiarity with common childhood diseases:

Familiarity with roseola:

Good level of knowledge
Moderate level of knowledge
Little level of knowledge
Never heard of it

Familiarity with Bronchiolitis:

Good level of knowledge
Moderate level of knowledge
Little level of knowledge
Never heard of it
Familiarity with pneumonia:
Good level of knowledge
Moderate level of knowledge
Little level of knowledge
Never heard of it
Familiarity with lower respiratory tract infection (LRTI) :
Good level of knowledge
Moderate level of knowledge
Little level of knowledge
Never heard of it
Familiarity with respiratory syncytial virus (RSV):
Good level of knowledge
Moderate level of knowledge
Little level of knowledge
Never heard of it
Familiarity with gastroenteritis :
Good level of knowledge
Moderate level of knowledge
Little level of knowledge
Never heard of it
Familiarity with strep throat:
Good level of knowledge
Moderate level of knowledge
Little level of knowledge
Never heard of it
Familiarity with influenza:
Good level of knowledge
Moderate level of knowledge
Little level of knowledge
Never heard of it
Estimation of the severity if your infant(s) were to get: (1 to 7 scale; 1 Mild , 7 very sever)
Bronchiolitis
Respiratory Syncytial Virus (RSV)
If one or more of your children had RSV and/or bronchiolitis; where did the child receive the diagnosis and/or treatment (optional)
Primary care center
Emergency room
Neonatal or special care baby unit
Regular children hospital
Other
Feeling of being well-informed about RSV after diagnosis with RSV and/or bronchiolitis (1-7 scale) (if question 3 is answered)
Level of concern about child getting RSV (1-7 scale)?
If any concern: Which aspects of RSV are concerning.
The prevalence in infants
Severity
Limited prevention options
Limited treatment options
The spread and transmission of RSV
If any concern: Which impacts/symptoms are concerning.
Breathing difficulties
Decrease in appetite.
Cough
Congestion
Risk of hospitalization
need for medical intervention to regulate breathing.
risk of acute Lower respiratory tract infection (LRTI), primarily bronchiolitis and pneumonia

D-Attitudes to RSV immunization with monoclonal antibodies (mAbs)

Estimated benefit of this RSV immunization to your infant child/children (1-7 scale)
Which information about RSV immunization is most important for you
Safety
Efficacy
Durability
Cost
RSV disease
No need for any of those
Likelihood to accept RSV immunization if recommended as part of the childhood immunization program and by the child's HCP, neonatalist or pediatrician, respectively (1-10 scale)
Main reasons to accept RSV immunization.
I want to protect my infant at an age where they are most susceptible to RSV.
I believe it is important to protect my child against RSV.
It is shown to be effective.
It is shown to be safe / have few adverse reactions.
RSV is a severe disease.
I might regret not immunizing my child, if he/she later gets RSV.
My child is protected for the RSV season (5 months)
my child is at risk of contracting RSV.

I had worrying experiences with RSV myself, in my family or among friends.
Other (not mentioned above)
Main reasons to be hesitant towards RSV immunization.
I am concerned about the potential side effects / adverse reactions.
I am concerned it is a new immunization.
I don't know enough about this RSV immunization.
I am worried that it is not effective (does not work)
I am worried about the length of protection.
There are already too many childhood immunizations.
I don't know enough about RSV.
The risk of my infant child getting severe RSV is low.
The risk of my infant child getting RSV is low.
I do not think it is important to protect against RSV.
Other (not mentioned above)
Choices between best representation of attitudes (sliding scale)
Waiting for RSV immunization to be recommended by an HCP versus proactively asking an HCP about it.
Acceptance of RSV immunization only if included in the immunization program or even if not included.
Hesitance towards a new immunization versus wanting it for your infant as soon.
Preferred sources of information about RSV immunization
Health care workers
Friends and family
Health website
General information Websites
Books
Social media
Articles on journals and magazines
Preferred time of information about RSV immunization
when trying to conceive
pre- natal
right after delivery
during follow-up appointments on your infant's health status

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