Knowledge and Attitude Towards Childhood Immunization among Parents in Al-Mukalla, Yemen

Fauzia Faraj Bamatraf (1)
Mazin Ahmed Jawass (2)

(1) Associate Professor of Community Health, Department of Community Medicine College of Medicine and Health Sciences, Hadhramout University, Republic of Yemen
(2) Associate Professor of Pediatrics, Department of Pediatrics, College of Medicine and Health Sciences, Hadhramout University, Republic of Yemen

Correspondence:
Fauzia F Bamatraf
Associate Professor of Community Health, Department of Community Medicine
College of Medicine and Health Sciences, Hadhramout University,
Republic of Yemen
Mobile: +967 735306070
Email: ffbamatraf2008@yahoo.com

Abstract

Background: According to the World Health Organization, millions of children worldwide are not fully immunized, mostly in developing countries. WHO has estimated that access to services, parental attitudes, knowledge and practices seems to play a significant role in this regard. This study aimed to assess the knowledge and attitudes towards childhood immunization amongYemeni parents in Al-Mukalla city.

Methods: A cross-sectional analytical study was conducted in four governmental kindergartens in Al Mukalla city, Hadhramout Governorate, Yemen, between December 2013 and March 2014. A multistage sampling method was used for the selection of participants. Data was collected by using pretested self-administered questionnaires.

Results: A total of 400 Yemeni parents participated in the study. Out of them, mothers comprised (73%) of the sample and the remaining (27%) were fathers. In general, the study showed that parents had a positive attitude towards childhood immunization with respect to most of the subjects investigated and (63.3%) had moderate knowledge scores towards them. Health workers were the main source of information for the majority of parents (90.7%). Furthermore statistically significant differences was found in the mean score of parents' knowledge with their age group and the number of their preschool children (P <0.025 and p <0.001, respectively)

Conclusions: Parents demonstrated moderate knowledge scores and a positive attitude towards childhood immunization. There is a need for health education to upgrade parents' knowledge with emphasis on young parents as well as health workers.

Key words: Childhood Immunization, Parents, Knowledge, Attitude, governmental kindergartens, Yemen

Please cite this article as: Fauzia Faraj Bamatraf, Mazin Ahmed Jawass. Knowledge and Attitude Towards Childhood Immunization among Parents in Al-Mukalla, Yemen. World Family Medicine. 2018; 16(2): 24-31.
DOI: 10.5742/MEWFM.2018.93239

Introduction

As highlighted by the World Health Organization (WHO), vaccination is one of the most cost -effective health interventions available, saving millions of people from illness, disability and death each year from vaccine-preventable diseases including diphtheria, hepatitis B, measles, mumps, pertussis, pneumonia, polio, rotavirus diarrhea, rubella and tetanus.(1) WHO reported that "the number of deaths per year in children between the ages of 1 and 59 months was 5.2 million.

About 29% of these deaths in children in this age group are due to vaccine-preventable diseases.(2) In addition WHO estimated that "if all the vaccines now available against childhood diseases were widely adopted as part of the Expanded Program on Immunization (EPI) in some regions of the world. and if countries could raise vaccine coverage to a global average of 90%, an additional two million deaths a year could be prevented among children under five years old".(1)

In Yemen, to maintain high levels of immunization coverage among children, health authorities have taken important steps to support routine immunization and to implement supplementary immunization activities.(3) Yet, despite the concerted efforts of the government, a large proportion of vulnerable infants and children in Yemen remain unimmunized. Although EPI has been implemented in Yemen since 1979 (4) and despite it being available free of charge to the public the full coverage of immunization among Yemeni children in the age group of 12-23 months was only 37.2%.(5)

According to the World Health Organization (WHO), millions of children around the world are not fully immune, mostly in developing countries, because of immunization issues, which are the most common factors that lead to incomplete vaccination of children. (6) In addition, the WHO has estimated that access to services, parental attitudes, knowledge and practices appears to play a greater role among children who have not received any vaccination.(6)

The knowledge, attitudes and practices of parents have also been identified by many studies as factors related to the success or failure of the immunization program.(7,8,9) Previous studies observed that, parents' knowledge and attitudes towards immunization were significantly associated with childhood immunization coverage and can affect the immunization status of children. (9,10) Furthermore, other studies have demonstrated an association between parental sociodemographic characteristics and child's immunization coverage, such as education and age of the parents, number of preschool children, and family income.(11,12,13) Previous studies have shown that healthcare providers also play an important role in the rate of immunizing children.(14,15) It was found that parents' knowledge and attitudes towards vaccinating their children depends on the quality of information provided to them by health care providers about the importance, timing and safety of vaccination.(16,17) They may affect parents' knowledge, practices and their decisions about child vaccination.(18,19)

There are currently no studies available on parents' knowledge and attitudes towards childhood immunization in Yemen, as in Al-Mukalla local area. it is high time for such a study to be carried out to assess the knowledge and attitudes towards childhood immunization and their associated factors among Yemeni parents. It is believed that this study may provide useful information to the Yemeni community and Yemeni authorities such as the Ministry of Health to perform more effective vaccination programs.

Materials and method

This was a cross-sectional study conducted at public kindergartens in Al-Mukalla, the capital of the Hadhramout Governorate, Yemen, between December 2014 to March 2015. The study population consists of all parents whose children were learning in public kindergartens. All public kindergartens (total 4) were selected from the different areas of Al-Mukalla.

A sample size of 384 parents was determined by using recommended statistical methods.(20) It was increased to 400 for an expected non-response. The sample size of parents was distributed proportionally among all four selected kindergartens according to total number of children in each kindergarten and the parents of children were selected randomly. A total of 400 questionnaires were distributed to parents of children attending selected kindergartens. The questionnaire was sent along with a letter explaining the objectives of the study to the parents, as well as an envelope to facilitate the return of the completed questionnaire. Parents were asked to return the completed questionnaires in the envelopes submitted before the deadline by submitting them to the class teacher.

Written consent was obtained for participation in the study from all participants. The researchers collected the completed questionnaires through kindergarten teachers. When a teacher did not receive a questionnaire from a child during 3 to 5 days, the teacher sent a reminder home with the child. Data were collected with self-administered pre-tested questionnaire. The questionnaire was divided into two parts; the first part covered questions on personal and socio-demographic characteristics of parents and the second part covered questions which were pre-designed to assess their knowledge and attitude to childhood immunization.

Responses to the questions of knowledge were recorded as "Yes", "No", and "Don't know". A three point-Likert scale was used to assess parents' attitudes about child immunization, with the following responses: ("Agree", "Not sure", "Disagree",). The pre-testing of the questionnaire of the study was conducted on 15 parents. The sample of parents used in this pre-test was not included in the study. During the pre-test a few difficult words in some questions

were found and these words were changed into simple local words, and the final questionnaire was modified according to the necessary results.

Statistical Analysis: Data was coded, reviewed and entered using Statistical Package for Social Science (SPSS) version 20. Knowledge scores were assessed using a scoring system as following:

Knowledge scale:

The knowledge scale consisted of 15 items. Each correct answer was given 1 score and zero score for a wrong or unknown answer. The total knowledge score ranged from 0 to 15 and was classified as, high knowledge score : > mean + SD, moderate knowledge score: mean −SD to mean + SD and low knowledge score l :< mean −SD. One-way ANOVA was used to assess if there was any significant difference between socio-demographic characteristics and mean scores of knowledge of parents. p-values less than 0.05 indicated statistical significance.

The study protocol was approved by the Medial Research & Ethics Committee of the College of Medicine &Health Sciences at Hadhramout University (HUCOM). A letter was obtained from the Ministry of Education of Al-Mukalla district to the manager of each of the 4 selected public kindergarten to facilitate our data collection. The objective of the study was explained to the subjects, and written consent was obtained from all parents before enrollment in the study as explained above.

Results

Four hundred questionnaires were distributed to parents and 400 participants agreed to participate in the study. Response rate was 100%. Table 1 summarized demographic characteristics of parents. Mothers participants comprised (73%) of the sample and the remaining (27%) were fathers. In terms of age, the parents' age ranged from 25 to 48 years. The mean of their age was 37.01 ±4.76 years. The majority (64%) of them were in age group 30 – 39 years. University graduates and secondary educated were (34% & 28% respectively). The majority of mothers (73.8 %) have taken decisions concerning the immunization of their children.

Table 1: Demographic characteristics of the parents

Characteristic	No	%
Parental relationship:		
Mothers	292	73
Fathers	108	27
Age group of parents (years):		
< 30	40	10
30-39	256	64
≥40	104	26
Mean age ± SD*	37.01 ± 4.76	
Parents' educational level:		
Illiterate	97	24.3
Primary	55	13.7
Secondary	112	28
Graduate	136	34
Number of preschool children:		
One	68	17
2-3	158	39.5
>3	174	43.5
Decision-maker (on child immunization issues):		
Father	62	15.4
Mother	295	73.8
Both	43	10.8

* Standard Deviation

With regards to knowledge of childhood immunization, participants answered a total of 15 closed ended, multiple choice questions. Each response was given one mark with a total of 15 marks. The mean knowledge score for the participants was 8.58.± 2.19 (Table 2). Based on the scoring system described in the methodology it was found that the majority of the parents (63.3%) had " moderate " knowledge scores, 23.3% of them had "high knowledge "while 13.5% had "low knowledge (Table 2).

Data revealing the parents' knowledge of immunization are shown in Table 2. It is apparent from the table that all parents (100%) had heard about immunization and the main source of their information were the health workers (90.7%). The majority of parents (93.8%) knew that immunization prevents disease and they know also it's complications and the majority of them considered that vaccination should be completed as per schedule less than 2 years (82.3%) and that a healthy child needs vaccination (92.8%). While only the minority (41.2%) of them know when to start the vaccination schedule.

The results also showed that more than half of the participants (57.7%) correctly answered that the vaccine was for all ages while only 41.3 knew that more than one vaccine at the same time had no adverse effects on the child's immunity. On the other hand, more than half of the parents (51.3%) know that multiple doses of vaccine given at time intervals are important for the child's immunity.

With regards to the name of the diseases against which children are immunized, all parents correctly knew that Oral Polio Vaccine (OPV) protects against polio and measles Vaccine protects against measles disease (100%). While a small percentage of them knew BCG protects against Tuberculosis (17.8%), Hep B protects against Hepatitis B (26.3%) and DPT vaccination protects against three diseases (Diphtheria, Pertussis and Tetanus) (10%). Most of the parents did not accept that harm of the vaccine is more than benefits (92.8%). Common colds, ear infections and diarrhea were considered as contraindications for vaccination by (45%) of the parents Table 2.

Table 2: Parents' knowledge towards childhood immunization

Knowledge items	Response	Frequency	Percentage
Have you heard about childhood immunization	Yes No	400 0	100 0
Source of information for immunization program	Radio Television Health workers	20 17 363	5 4.3 90.7
Immunization prevents disease and its complications	Yes No	375 25	93.8 6.2
Healthy children need vaccination	Yes No	371 29	92.8 7.2
Immunization start first week of life	Yes No	165 235	41.2 58.8
Uniform schedule less than 2 years	Yes No	329 71	82.3 17.7
Immunization is for all ages.	Yes No	231 169	57.7 42.3
More than one vaccine at the same time has no adverse effects on child's immunity	Yes No	165 235	41.3 58.7
Multiple doses of the same vaccine given at time intervals are important for child's immunity	Yes No	205 195	51.3 48.7
Name the diseases that the child is immunized against	Polio (OPV) Measles BCG Hep B DPT	400 400 71 105 40	100 100 17.8 26.3 10.3
Immunization can be associated with the risk of side effects	Yes No	140 260	35.0 65.0
Common colds, ear infections and diarrhea are contraindications for vaccination	Yes No	180 220	45 55
Total mean knowledge scores ± SD	8.58.± 2.19		

Regarding parents' attitude Table 3 shows that parents in general had positive attitudes towards childhood immunization. All parents are in favor of vaccination program (100%), and all agree that immunizing children is important (100%). The majority of them agreed that immunization is more beneficial than harmful and agreed that vaccines are safe for the children (92% &71.2% respectively). In addition the majority of parents agreed on the importance of following the immunization schedule and immunization kept the child healthy (94% and 96.5%, respectively).

Table 3: Attitude of parents toward childhood immunization

Questions	Response	Frequency	percentage
In favor of Vaccination program	Agree	400	100
	Disagree	0	0
	Not sure	0	0
Child immunization is important	Agree	400	100
	Disagree	0	0
	Not sure	0	0
Immunization is more beneficial than harmful	Agree	368	92.0
	Disagree	10	2.5
	Not sure	22	5.5
Vaccines for child immunization are safe	Agree	285	71.2
	Disagree	32	8.0
	Not sure	83	20.8
Important to follow vaccination schedule	Agree	376	94
	Disagree	10	2.5
	Not sure	14	3.5
Immunization keeps your child healthy	Agree	386	96.5
	Disagree	4	1.0
	Not sure	10	2.5

Table 4 shows ANOVA statistical results for the knowledge scores by educational level and age group of parents and by the number of their pre-school children. It was found that there was significant difference in the mean knowledge scores of parents with age group (≤30 years and ≥40 years), and between parents with age group (31-39 years and ≥40 years) (p value = 0.025). Mean knowledge scores were significantly lower among those in age group ≤30 years compared to parents in other age groups.

There was also significant difference in the mean knowledge scores between those parents who had one preschool child and those who had 2-3 preschool children and between those parents who had 2-3 children and those who had more than three children (p value= 0.001). Mean knowledge scores were significantly lower among those parents who had one preschool child compared to those who had 2 or 3 and more preschool children. Regarding educational level there was no significant difference of mean knowledge scores between these levels.

Table 4: Mean total childhood Immunization knowledge scores by socio-demographic characteristic among parents (N = 400)

Variable	Categories	No (%)	Knowledge score: Mean ± SD	P-value*
Parents' education	Illiterate	[97 (24.3%)]	8.72 ± 1.09	
	Primary	[55 (13.7%)]	8.46 ± 1.11	0.723
	Secondary	[112 (28%)]	8.82 ± 1.18	
	University	[136 (34%)]	8.85 ± 1.23	
Parents' age group	< 30	[40 (10%)]	7.82 ± 1.27	
	30-39	[256 (64%)]	8.87 ± .956	0.025
	≥ 40	[104 (26%)]	8.63 ± 1.07	
Number of preschool children	One	[68 (17%)]	7.97 ± 1.43	
	2-3	[158 (39.5%)]	8.76 ± 1.13	0.001
	> 3	[174 (43.5%)]	8.84 ± .979	

* One way ANOVA ($p < 0.05$ is considered statistically significant)

Discussion

It is widely accepted that childhood immunization programs have played a great part in the prevention of many diseases; hence, vaccination coverage is an indirect way to assess child health care.(20) Our study revealed that almost all parents were aware of childhood immunization and the majority of them knew the importance of following the immunization schedule to keep their children healthy. Many studies around the world have shown that successful childhood immunization depends on good knowledge of parents and their positive attitudes.(21,22,23)

The current study revealed that health workers are the main source of vaccination information for the vast majority of participants. Our findings were in agreement with the findings of other studies. where health workers were the main source of participants' information towards childhood immunization.(14,17,18,19) However, our findings were in contrast with other studies which consider media as a strong source for providing of participants' information about vaccination.(24,25,26)

Parental knowledge scores were assessed in this study by collecting the knowledge score for each parent. Data demonstrated that the majority, 63.3% of parents had moderate or adequate knowledge. Unfortunately, previous studies about childhood immunization among Yemeni parents are not available to compare with our findings. However similar results were reported from different countries(27,28,29,30) where the majority of participants had adequate knowledge.

This observation is in contrast with other studies. One of these studies from Libya reported the knowledge of studied mothers about vaccination is not completely adequate.(29) In China, Wang et al observed that 60% of studied mothers were found to have inadequate knowledge towards immunization in childhood.(30) Low levels of knowledge in many countries can be affected by many factors including immunization providers, sources of information and other barriers.

Although the fact that the majority of our participants had awareness about childhood vaccination from the health workers, a good proportion did possess deficiencies in their knowledge about some aspects of it, which could somehow indicate that information given to them was incomplete. However, in the succeeding questions presented to parents, only 41.2% of our participants know when to start the vaccination schedule and slightly more than half of them knew that multiple doses of vaccine given at time intervals are important for child's immunity (51.3%). Most vaccines in the childhood immunization schedule require two or more doses for development of an adequate and persisting antibody response.(31) Our study found that, health workers have a responsibility to inform the majority of parents about immunization. There is a need to educate health workers in this area, and this area also requires further strengthening. Many studies showed that parents' knowledge regarding child immunization varies according to the family physician and other medical staff.(25,32)

Another very important area that the parents lacked knowledge in was that more than half of them (58.6%) do not know that giving more than one vaccine at the same time has no negative impacts on child immunity.(31) In agreement, in another study "a quarter of the parents believed that their child's immune system could become weakened as a result of too many immunizations".(32) To date "there is no scientific evidence that supports parents' fears about combined vaccines causing immune overload".(16)

Our study also revealed that 35% of the parents believe that Immunization can be associated with the risk of side effects. It obvious that parents were not well aware of the potential side effects of immunization. Concerns about immunization safety and regarding the adverse impact of possible side effects on immunization coverage have been reported earlier.(33) It was reported that "the administration of vaccines may be associated with common local reactions like pain, swelling, and redness at the injection site".(31) This area also requires further strengthening and our participants should be educated about these side effects.
Another area in which the parents scored low is the question on the name of the diseases against which child is immunized, indicating opportunity for education. Responses revealed that nearly all parents correctly named diseases only polio and measles, while a small percentage of them know the names of diseases prevented by the BCG, hepatitis B and DPT. Furthermore, 55% of our parents believe that common colds, ear infections and diarrhea were contraindications to vaccinate children. Parents need reliable accurate information on true contraindications so that opportunities to immunize an infant or child are not missed. In fact, there are very few true contraindications. "Deferral or delay of immunization based on misconceptions about contraindications puts an infant or child at risk".(31)

With regard to attitudes, our findings generally revealed that participants had a positive attitude towards immunization in childhood. All parents agreed with vaccination programs and agreed that the vaccination was important. As well, the majority of them agreed that they should follow the vaccination schedule to keep their children healthy. Our finding was consistent with other studies from different countries in which the majority of respondents have a positive attitude towards childhood vaccination.(14,25.27) "Understanding parents' knowledge and attitudes towards immunization is important, parent's involvement was shown to be associated with the child's vaccination status".(23)

The findings of the present study showed that there were statistically significant differences between parents in their mean knowledge scores. However the difference between them was found in some variables. With regard to the age of parents, it was found that parents aged 30 years or younger showed significantly lower knowledge scores compared to older parents. This finding is consistent with another study,(28) that reported that older parents have higher knowledge. This may be because older parents are more knowledgeable and experienced. In contrast to our findings, a study in Saudi Arabia conducted by Jamman

(25) observed that "older mothers were less likely to have knowledge towards child vaccination. Perhaps, in older women, this reflects a higher prevalence of traditional nihilistic views, such as destiny being the cause of disease". The same finding has been reported Also by Bernsen et al in UAE.(34)

The study also found statistically significant differences in the average score of parents' knowledge with the number of pre-school children. Mean knowledge scores were significantly lower among those parents who had one preschool child compared to those who had 2 or 3 and more preschool children. This finding is consistent with the study conducted by Al-lela et al (35) where a significant association of parent's KAP with number of children was found.

Conclusions

In conclusion the present study showed that in general parents had moderate knowledge scores and a positive attitude towards childhood immunization. However, a good proportion of them demonstrated insufficient knowledge about some important points such as side effects, timing of the first dose of vaccination and the name of certain diseases that are immunized against in children. Health workers were the main source of their information. There is a need to educate health workers and parents on certain aspects of immunization in childhood, and they should focus particularly on younger parents.

Acknowledgement
The authors would like to thank kindergarten teachers for their help in coordinating data collection. Our special thanks to all parents who participated in the study for their kind cooperation.

References

1. WHO, UNICEF, World Bank. State of the world's vaccines and immunization, 3rd ed. Geneva, World Health Organization, 2009 available at https://www.unicef.org/immunization/files/SOWVI_full_report_english_LR1.pdf
2. World Health Organization. Global immunization data. 13, Available at:
http://www.who.int/immunization/monitoring_surveillance/global_immunization_ data.
3. Ministry of Public Health the annual report of child health directorate 2004 Sana'a (Yemen) Ministry of Public Health; 2004
4. Ministry of Public Health and Population. Immunization programs. Achievements of the Expanding Program of Immunization EPI Yemen 2006. From http://www.mophp-ye.org/english/polio.html. Jheeta M, Newell J Accessed in March 2011)
5. Ministry of Public Health. Yemeni survey for Family Health 2004.Sana'a (Yemen): Ministry of Public Health and Population, the Central Statistical Organization and the Arab Project of Family Health, 2004
6. World Health Organization . Global routine vaccination coverage 2011. Published in the Weekly Epidemiological Record on 2 November 2012 http://www.who.int/immunization/documents/vaccination_coverage/en/
7. Adhikari P, Dhungel S, Shrestha R et al. Knowledge, attitude and practice (KAP) study regarding facts for life. Nepal Med Coll J. 2006; 8: 93-6.
8. Anjum Q, Omair A, Inam SN et al. Improving vaccination status of children under five through health education. J Pak Med Assoc 2004; 54: 610-3.
9. Salam Md Mushtahid, Uddin Md Shahab, Khan Md Faiz Ahmad, Mazumdar Pranay, Huq Md Ershadul, Yousuf Rabeya and SalamAbdus. "Maternal Awareness on Under-5 Child Immunization in Rural Community of Bangladesh", International Medical Journal,2013; 20(6): 681-684
10. Amin R, De Oliveira TJ, Da Cunha M, Brown TW, Favin M, Cappelier K. Factors limiting immunization coverage in urban Dili, Timor-Leste. Glob Health Sci Pract. 2013 Nov 14;1(3):417-27.
11. Siddiqi N, Siddiqi AE, Nisar N, Khan A. Mothers' knowledge about EPI and its relation with age-appropriate vaccination of infants in peri-urban Karachi. J Pak Med Assoc 2010; 60: 940-944.
12. Olugbenga-Bello Adenike, Jimoh Adejumoke, Oke Olufunmi, Oladejo Ridwan. Maternal characteristics and immunization status of children in North Central of Nigeria. African Medical Journal. 2017; 26:159
Available online at: http://www.panafrican-med- ournal. com /content/article /26/159/full
13. Kimmel SR, Burns IT, Wolfe RM, Zimmerman RK . Addressing immunization barriers, benefits, and risks. J Fam Pract 2007; 56: 61-69.
14. Zagminas K, Surkiene G, Urbanovic N, Stukas R. Parental attitudes toward children's vaccination. Medicina (Kaunas) 2007; 43: 161-169.
15. Al-lela OQ, Baidi Bahari M, Al-abbassi MG, Salih MR, Basher AY. Influence of health providers on pediatrics' immunization rate. Trop Pediatr. 2012 ; 58(6):441-5.
16. Thomas M, Kohli V, King D. Barriers to childhood immunization: findings from a needs assessment study. Home Health Care Serv Q 2004; 23: 19-39.
17. Chia-Wan Tang, Shih-Hui Huang, Ken-Pen Weng, Luo-Ping Ger, Kai-Sheng Hsieh. Parents' Views About the Vaccination Program in Taiwan. Pediatrics & Neonatology 2011; 52(2): 98-102.
18. Smith PJ, Kennedy AM, Wooten K, Gust DA, Pickering LK. Association between health care providers' influence on parents who have concerns about vaccine safety and vaccination coverage. Pediatrics 2006; 118: 1287-92.
19. Nath B, et al: KAP study on immunization of children in a city of North India–a 30 cluster survey. Online J Health Allied Sci. 2008; 7(1): 1–6.
20. Cochran WG. Sampling Techniques (1963). 2nd ed. New York: John Wiley and Sons, Inc
21. Tang CW, Huang SH, Weng KP, Ger LP. Parents' Views About Vaccination Program in Taiwan. Pediatrics and Neonatology 2011; 52: 98-102.
22. Angelillo I, et al: Mothers and vaccination: knowledge, attitudes, and behavior in Italy. Bull World Health Organ 1999, 77(3): 224–229. Available at:
http://www.who.int/bulletin/archives/77(3)224. [accessed May, 2017].
23. Sara Devkota, Padam Simkhada, Edwin van Teijlingen, Lal D Rai. Parents' knowledge and practices to childhood immunization in Nepal: implications for health policy. Health Science Journal. 2013; 7(4): 370-83. Available at:

http://www.hsj.gr/medicine/parents-knowledge-and-practices-to-childhood-immunisation-in-nepal-implications-for-health-policy.php?aid=2814[accessed July 2017].
24. Samah Omar Alfahl and Khulood Mohammed Alharbi. Parents' Knowledge, Attitude and Practice towards Childhood Vaccination, Medina, Saudi Arabia 2017, Neonat Pediatr Med. 2017; 3(1): 1-8. Available at:
25. Jamman Al-Zahrani. knowledge, attitudes and practices of parents towards childhood vaccination MAJMAAH J. Health Sciences, 2013 – vol. 1, No. 1
26. Al-lela Omer Qutaiba , Mohd Baidi Bahari Muhannad RM Salih, Mustafa G Al-abbassi, Ramadan M Elkalmi, and Shazia Q Jamshed. Factors underlying inadequate parents' awareness regarding pediatrics immunization: findings of cross-sectional study in Mosul- Iraq, BMC Pediatrics. 2014; 14: 1-7
Available at https://www.ncbi.nlm.nih.gov/pubmed/24460878 accessed July/ 2017
27. Angelillo I, et al. Mothers and vaccination: knowledge, attitudes, and behavior in Italy. Bull World Health Organization. 1999; 77(3): 224–229. Available at: http://www.who.int/bulletin/archives/77(3)224.
28. Yousif MA, Ahmed Abdulrahman Albarraq, Mustafa Awad A Abdallah and Abubaker Ibrahim Elbur. Parents′ Knowledge and Attitudes on Childhood Immunization, Taif, Saudi Arabia 2013. J Vaccines Vaccin. 2013; 5(1): 215-220
29. Mabrouka A.M. Bofarraj. Knowledge, attitude and practices of mothers regarding immunization of infants and preschool children at Al-Beida City, Libya 2008, Egypt J Pediatr Allergy Immunol. 2011; 9(1):29-34.
30. Wang YY, et al: Status of mother's KAP on child immunization in minority areas, Guizhou Province. Beijing Da Xue Xue Bao. 2007; 39(2):136–139.
31. Centers for Disease Control and Prevention (CDC) Multiple Vaccines and the Immune System. available at: https://www.cdc.gov/vaccinesafety/concerns/multiple-vaccines-immunity.html accessed August / 2017
32. Hariweni T. et al. Knowledge, attitude, and practice of under five children stimulation of working and nonworking mothers. Paediatr Indones. 2004; 44(3–4): 101–105.
33. Hilton S, Petticrew M, Hunt K. Combined vaccines are like a sudden onslaught to the body's immune system: parental concerns about vaccine 'overload' and 'immune-vulnerability'. Vaccine. 2006; 24: 4321-4327
34. Bernsen RM, Al-Zahmi FR, Al-Ali NA, Hamoudi RO, Ali NA, et al. Knowledge, attitude and practice towards immunizations among mothers in a traditional city in the United Arab Emirates. Journal of Medical Sciences. 2011; 4: 114-121.
35. Al-lela OQ, Baidi Bahari M, Al-Qazaz HK, Salih MR, Jamshed SQ and Elkalmi RM. Are parents' knowledge and practice regarding immunization related to pediatrics' immunization compliance? A mixed method study. BMC Pediatrics 2014, 14:20 Available at: https://www.ncbi.nlm.nih.gov/pubmed/24460878. Accessed July/ 2017