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## ABSTRACT

Islam Tariq  
<https://orcid.org/0009-0005-6809-6904>  
College of Pharmacy, University of  
Mosul, Mosul, Iraq

Farah Ramzi  
<https://orcid.org/0009-0009-7360-3746>  
College of Pharmacy, University of  
Mosul, Mosul, Iraq

Hala F. Kasim  
<https://orcid.org/0000-0002-9425-0777>  
College of Pharmacy, University  
of Mosul, Mosul, Iraq

Salah Yousif  
<https://orcid.org/0000-0003-2646-1609>  
College of Pharmacy, University of  
Mosul, Mosul, Iraq

Suhir M. Rashid  
College of Pharmacy, University of  
Mosul, Mosul, Iraq

Luma M. Al-Obaidy  
<https://orcid.org/0000-0002-7794-1373>  
College of Pharmacy, University of  
Mosul, Mosul, Iraq

## PARENTS' KNOWLEDGE AND ATTITUDE TOWARD CHICKENPOX AND ITS PREVENTION

**Introduction:** Chickenpox is a highly contagious condition, often leading to severe illness in adults and immunocompromised conditions, attributed to the varicella-zoster virus. Therefore, these facts describe the importance and severity of chickenpox that makes prioritizing protection through vaccination a point of need. However, confirmation and utilization depend on the knowledge and attitude of parents. This study was done to assess the knowledge and attitude of parents toward chickenpox and vaccination for its prevention.

**Methods:** This cross-sectional study enrolled 261 parents of children visiting the primary healthcare centres. It used a pretested questionnaire requesting information regarding demographic characteristics along with an assessment of knowledge and attitudes toward chickenpox and the chickenpox vaccine. Appropriate statistics in the descriptive form and in proper tests, including chi-square and Fisher exact tests, were drawn for proper data analysis.

**Results:** 64.4% of the participants were willing to accept chickenpox vaccination for their children. Predictors of willingness to vaccinate were: living in a family with fewer rooms ( $p=0.028$ ) and being married ( $p=0.026$ ). In all, 98.2% of those willing to be vaccinated were knowledgeable about chickenpox, compared to 86.0% of those unwilling ( $p<0.001$ ). There was also a significant correlation between perceived risk of reinfection and attitude towards vaccination ( $p=0.002$ ). This is an indicative study that shows that educational intervention for parents is necessary to clear myths and misconceptions associated with chickenpox and its prevention.

**Conclusion:** Increasing parents' knowledge regarding vaccine safety and efficacy and measures taken to ensure the safety of the vaccine and promoting it in the community can help in the acceptance of the vaccine and may further reduce the incidence of chickenpox.

**Keywords:** Chickenpox, Varicella, Vaccine, Knowledge, Attitude, Parents.

**Corresponding author:** Islam Tariq, College of Pharmacy, University of Mosul, Mosul, Iraq  
e-mail: [islam.tarik@uomosul.edu.iq](mailto:islam.tarik@uomosul.edu.iq)

## INTRODUCTION

Chickenpox is an infection by the varicella-zoster virus. It is a viral and highly communicable disease [1–4]. The disease was usually seen to be associated with an exanthem and fever; though capable of being self-limiting in healthy children, it may, at times, cause severe complications in the form of pneumonia, encephalitis, and secondary bacterial infections, among others [5–8]. The complications are relatively typical in older children and adults but are serious in the case of adults, pregnant women, and immunocompromised persons [9, 10].

Results from studies show that with the introduction of varicella vaccination during the 1990s, the burden of chickenpox has reduced dramatically in countries where more extensive vaccination programs have been implemented [11, 12]. The aim of achieving mandatory vaccination coverage continues to be one of the main challenges of vaccine hesitancy and refusal by the public in disease prevention and herd immunity [13–15].

Maternal knowledge, attitudes, and beliefs concerning childhood vaccines are an essential correlate to the acceptance and demand of such vaccines, including the chickenpox vaccine.<sup>16-18</sup> Other studies have shown that perceived risks and benefits, trust in healthcare providers, and sociocultural-driven actions inform parental vaccination decisions [19–21].

The large majority of the studies about knowledge and attitudes have been in respect of prevention through vaccination targeted at chickenpox [22–25]. However, the studies have been conducted across different cultural and socioeconomic settings, and generalizations cannot be made based on the populations. In the same way, it needs to be systematically assessed taking into consideration parents' views and concerns as awareness and attitude are also time-bound relative to the changes in public health policies, advocacy programs, and changes in society in general.

The questionnaire the main aim of conducting this study was to assess the knowledge and attitude of parents towards chickenpox and prevention by vaccination among a specific population. It can be used to guide targeted educational programs and public health strategies that may improve vaccination uptake and, consequently, improve how chickenpox prevention

and its control can be bettered in a community. It identifies gaps in knowledge, misconceptions, and factors associated with vaccine acceptance or hesitancy.

## MATERIALS AND METHODS

*Study Design and Participants:* A cross-sectional set-up was adopted for the present study with the doctors and parents as the study subjects. The study focused on 261 parents. Convenient sampling was used to recruit participants, and data were collected through a structured questionnaire by face-to-face interview. The study area was multicenter, cross-sectional, and conducted among the parents of children living in the primary health care centers of a municipality with an extensive geographic area.

*Data Collection:* The questionnaire developed for this study aimed to gather information on the following aspects: i) Demographic characteristics: Parents were asked about their age, gender, educational level, place of residence, number of rooms in their household, marital status, number of children, occupation, and family income. ii) Knowledge about chickenpox: Knowledge of parents was assessed, including good or bad knowledge about chickenpox, its onset symptoms, mode of spread, period of infection, and chance of reinfection. iii) Concerns about Chickenpox Vaccine: Parents were asked to rate their willingness to have their child vaccinated against chickenpox and their reasons for accepting or refusing the vaccination.

This questionnaire was developed through a review of the literature and subject to pilot testing for clarity, comprehension, and cultural relevance. Necessary modifications were made based on the results of pilot testing

*Data Analysis:* Analysis was done using SPSS software (Version 28.0, IBM Corp., Armonk, N.Y., USA), and the data were summarized as descriptive statistics on the demographic characteristics, knowledge, and attitudes with frequencies and percentages. Demographics, knowledge, and attitudes toward the chickenpox vaccine were analysed using chi-square tests and Fisher's exact tests. Statistical tests were used to study the relationship between parents' knowledge of chickenpox, beliefs about the illness, and their likelihood to vaccinate their children. A p-value less than 0.05 was considered statistically significant in all analyses.

**Ethical Considerations:** The study protocol was reviewed and approved by the College of Pharmacy in the University of Mosul (Session 05 on 02.03.2023). Informed consent was obtained from all participants before data collection. Confidentiality and anonymity of the participants were maintained throughout the study.

## RESULTS

**Demographic Characteristics:** The demographic characteristics of the participants are presented in **Table 1**. Among the 261 parents included in the study,

64.4% (n=168) were willing to vaccinate their children against chickenpox, while 35.6% (n=93) were unwilling.

**Table 1** shows that the number of rooms in the household and marital status were significantly associated with parents' willingness to vaccinate their children against chickenpox. Parents with fewer rooms in their household ( $p=0.028$ ) and those who were married ( $p=0.026$ ) were more likely to be willing to vaccinate their children.

**Table 1.** Demographic characteristics of parents with comparing their willingness to give chickenpox vaccine to their children, n=261

Variables	Willingness about using the Chickenpox vaccine		P- value
	Unwilling to give vaccine to their children 93 (35.6%)	Willing to give vaccine to their children 168 (64.4%)	
<b>Age (years), mean (SD)</b>	38.8 (9)		0.424
17-30	20 (21.5%)	33 (19.6%)	
31-45	48 (51.6%)	100 (59.5%)	
> 45	25 (26.9%)	35 (20.8%)	
<b>Gender</b>			0.087
Female	68 (73.1%)	138 (82.1%)	
Male	25 (26.9%)	30 (17.9%)	
<b>Educational level</b>			0.360*
Primary education	1 (1.1%)	0 (0.0%)	
Secondary education	8 (8.6%)	11 (6.5%)	
University degree education	84 (90.3%)	157 (93.5%)	
<b>Place of residence</b>			0.391*
In the countryside	3 (3.2%)	11 (6.5%)	
In the city	90 (96.8%)	157 (93.5%)	
<b>Number of rooms in the house</b>			<b>0.028</b>
< 4	48 (51.6%)	110 (65.5%)	
≥4	45 (48.4%)	58 (34.5%)	
<b>Marital Status</b>			<b>0.026*</b>
Widow	5 (5.4%)	6 (3.6%)	
Married	79 (84.9%)	158 (94.0%)	
Divorced	9 (9.7%)	4 (2.4%)	
<b>Number of children</b>			0.585
< 5	85 (91.4%)	150 (89.3%)	
≥ 5	8 (8.6%)	18 (10.7%)	
<b>Occupation</b>			0.212*
Free business	2 (2.2%)	0 (0.0%)	
Without work/housewife	12 (12.9%)	21 (12.5%)	
Employee	79 (84.9%)	147 (87.5%)	
<b>Family income</b>			0.094*
Low	6 (6.5%)	3 (1.8%)	
Medium	76 (81.7%)	151 (89.9%)	
High	11 (11.8%)	14 (8.3%)	

Note.: \* Based on Fisher's exact test, Significant level set at  $p \leq 0.05$

### Relationship between Children's Age and Parental Willingness to Vaccinate

The relationship between children's age and their parents' willingness to vaccinate them against chickenpox is presented in **Table 2**.

The results in **Table 2** indicate that parents' willingness to vaccinate their children against chickenpox was significantly associated with having children older than 18 years ( $p=0.04$ ). Parents with children older than 18 years were less likely to be

willing to vaccinate them compared to those with younger children.

### Relationship between Parents' Knowledge, Beliefs, and Willingness to Vaccinate

**Table 3** presents the relationship between parents' knowledge and beliefs about chickenpox and their willingness to vaccinate their children.

**Table 3** reveals a significant association between parents' knowledge about chickenpox and their willingness to vaccinate their children. A higher

**Table 2.** The relationship between children age and their parent willingness to give them chickenpox vaccine\*

Variables	Willingness about using the Chickenpox vaccine		p- value
	Unwilling to give vaccine to their children 93 (35.6%)	Willing to give vaccine to their children 168 (64.4%)	
<b>Children age &lt;1 year</b>			0.60
no	81 (87.1%)	150 (89.3%)	
yes	12 (12.9%)	18 (10.7%)	
<b>Children age 1-5 year</b>			0.26
no	62 (66.7%)	100 (59.5%)	
yes	31 (33.3%)	68 (40.5%)	
<b>Children age 6-10 year</b>			0.06
no	59 (63.4%)	86 (51.2%)	
yes	34 (36.6%)	82 (48.8%)	
<b>Children age 11-15 year</b>			0.48
no	60 (64.5%)	101 (60.1%)	
yes	33 (35.5%)	67 (39.9%)	
<b>Children age 16-18 year</b>			0.45
no	74 (79.6%)	140 (83.3%)	
yes	19 (20.4%)	28 (16.7%)	
<b>Children age &gt;18 year</b>			0.04
no	71 (76.3%)	145 (86.3%)	
yes	22 (23.7%)	23 (13.7%)	

Note: \*Multiple responses are allowed, Significant level set at  $p \leq 0.05$

proportion of parents who were willing to vaccinate (98.2%) had knowledge about chickenpox compared to those who were unwilling ( $p<0.001$ ). Additionally, a significant association was found between parents' beliefs about the possibility of reinfection with chickenpox and their willingness to vaccinate ( $p=0.002$ ).

Regarding the reasons for willingness to vaccinate, **Figure 1** shows that the most common reasons reported by parents were the belief that the vaccine is effective (61%), the desire to reduce infection risk (51%), and the aim to avoid the need for medications and quarantine (30%).

On the other hand, **Figure 2** illustrates that the main reasons for parents' unwillingness to vaccinate their children were the concern about potential risks and side effects of the vaccine (70%), the belief that it is better to use treatment and medications if infection occurs (25%), and disbelief in the effectiveness of the vaccine (25%).

Furthermore, **Figure 3** provides insights into parents' knowledge regarding the symptoms of the chickenpox vaccine. The most recognized symptoms were redness skin rash (94%), itching (87%), and fever (83%), while fatigue (55%), anorexia (41%) and headache (33%) were less frequently identified.

**Table 3.** The relationship between parents' knowledge and beliefs and their willingness to give chickenpox vaccine to their children, n=261

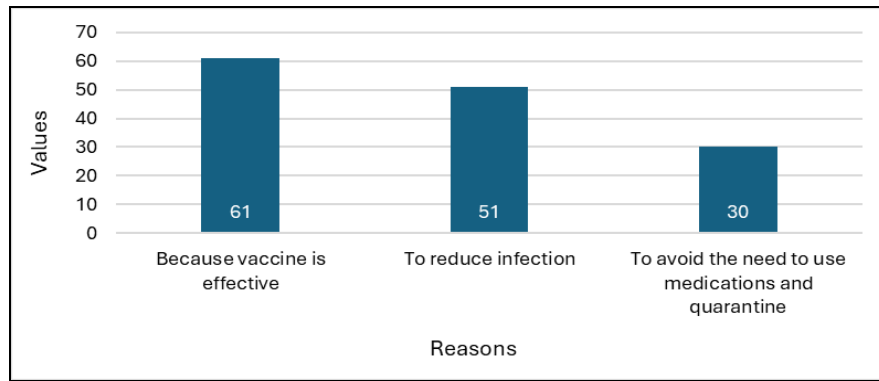
Variables	Willingness to allow using the Chickenpox vaccine		P-value
	Unwilling to give vaccine to their children 93 (35.6%)	Willing to give vaccine to their children 168 (64.4%)	
<b>Do you know what chickenpox is?</b>			0.000
No	13 (14.0%)	3 (1.8%)	
Yes	80 (86.0%)	165 (98.2%)	
<b>Do you think chickenpox is a serious disease?</b>			0.091
No	62 (66.7%)	94 (56.0%)	
Yes	31 (33.3%)	74 (44.0%)	
<b>Do you think chickenpox is a contagious disease?</b>			1.000*
No	1 (1.1%)	1 (0.6%)	
Yes	92 (98.9%)	167 (99.4%)	
<b>How does infection occur?</b>			0.299*
Oral (sharing food and drink)	18 (19.4%)	23 (13.7%)	
By breathing	15 (16.1%)	24 (14.3%)	
Direct contact	58 (62.4%)	120 (71.4%)	
Others*	2 (2.2%)	1 (0.6%)	
<b>What is the average infection period?</b>			0.441*
One week	14 (15.1%)	15 (8.9%)	
Two weeks	60 (64.5%)	113 (67.3%)	
Three weeks	14 (15.1%)	32 (19.0%)	
Four weeks	5 (5.4%)	8 (4.8%)	
Five weeks	0 (0.0%)	0 (0.0%)	
<b>Do you think that bathing increases the severity of the disease?</b>			0.111
No	51 (54.8%)	109 (64.9%)	
Yes	42 (45.2%)	59 (35.1%)	
<b>If a person has recovered from a previous infection with chickenpox, do you think he can become infected a second time?</b>			0.002*
Yes, and the severity of the injury is less than the first injury	27 (29.0%)	26 (15.5%)	
Yes, and it has the same symptoms as the first infection	4 (4.3%)	0 (0.0%)	
Yes, and the severity of the injury is more severe than the first injury	2 (2.2%)	8 (4.8%)	
Yes, with the appearance of other and new symptoms	2 (2.2%)	10 (6.0%)	
I don't think it's possible to get injured a second time	58 (62.4%)	124 (73.8%)	
<b>Have you heard of a vaccine against chickenpox?</b>			0.903
No	43 (46.2%)	79 (47.0%)	
Yes	50 (53.8%)	89 (53.0%)	

Note: \*Based on Fisher-exact test, Significant level set at  $p \leq 0.05$

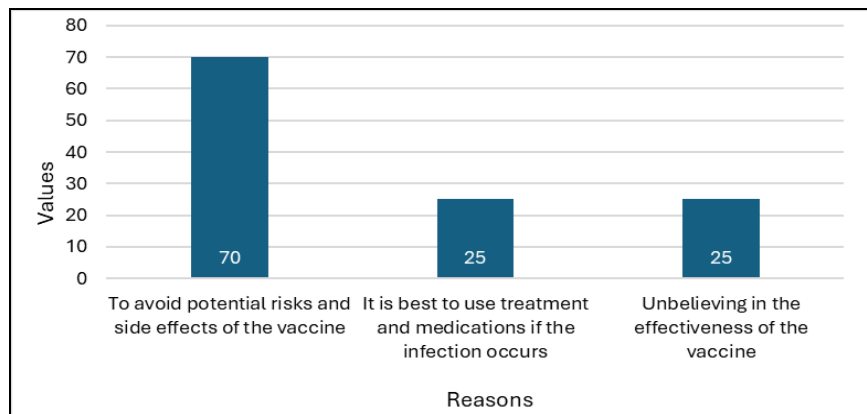
## DISCUSSION

The present study aimed to evaluate and gauge the level of understanding and willingness in parents to vaccinate their child against the varicella-zoster virus. This survey-based study aimed at finding the perception of parents and of their understanding of the disease in

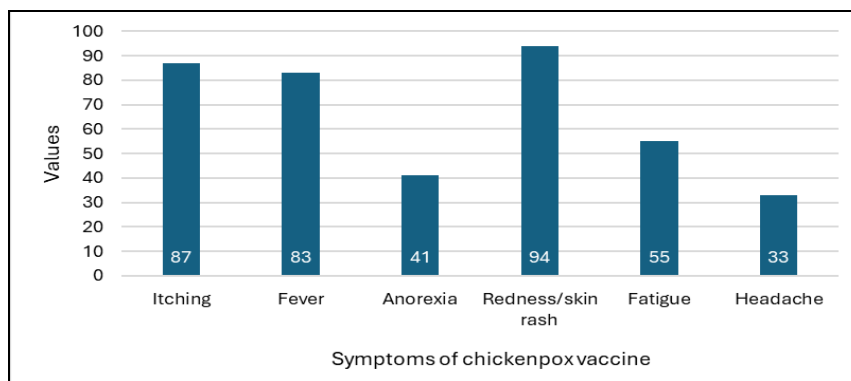
those who would and would not consider vaccinating their child. Results: A substantial proportion (64.4%) of the parents was willing to have their children vaccinated against chickenpox; this is similar to reports from studies in different settings such as Sweden and the UK [25–27].



**Figure 1.** The reasons for parents’ willingness to allow their children to receive the chickenpox vaccine, n=168



**Figure 2.** The reasons for parents’ unwillingness to allow their children to receive the chickenpox vaccine, n=93



**Figure 3.** Parents’ knowledge regarding symptoms of chickenpox vaccine

Since the 1990s, many countries have rolled out the prophylactic scheduled vaccinations for children from the time they are born until they reach their teenage years. The roll-out is said to reduce the incidence of the disease and reduce associated comorbidities of the virus. The immunisation program is said to be effective when there is acceptance amongst the wide population creating herd immunity. The issue then arises when parents choose not to vaccinate or are uninformed of the

importance of following the guidelines, potentially creating outbreaks in the community. From this study several demographic factors display correlations that parents who lived in fewer room houses, as well as married parents, were more willing to get their children vaccinated from chickenpox. These findings suggest that socioeconomic status and family dynamics likely influence parental vaccination decisions, which is consistent with existing research [17, 28].

The study also investigated the relationship between children's age and parental motivation to have their children vaccinated. The survey found that parents of children over 18 years of age were less inclined to vaccinate them compared to parents of younger children. This could be due to the perception that chickenpox is milder when it occurs in later life or that the vaccine is less effective in this age group [29, 30]. However, it is important to note that adults are at higher risk for severe complications from chickenpox, so susceptible adults of all ages should be vaccinated [31–33].

Knowledge and beliefs of the parents about chickenpox were significantly associated with their willingness to vaccinate their children. In a multivariable study based in Germany, parents who had a higher educational background more likely to vaccinate their children compared to those of lower socio-economical backgrounds. This is likely due to the parents increased access to knowledge on health matters than that of lower socio-economics statuses.<sup>27</sup> Parents who intended to have their children vaccinated knew more about the transmission of disease and the implications of contracting chickenpox. which is consistent with previous research findings that knowledge about the disease is associated with the decision to vaccinate [34, 35].

Additionally, parents who believed in the potential for reinfection with chickenpox were not significantly more likely to vaccinate. Those who refused the vaccine were more likely to think reinfection is possible and that the symptoms could be worse the second time around. This result demonstrates the importance of addressing misconceptions about chickenpox and providing accurate information regarding the advantages of avoiding reinfection[36,37].

It has been stated that vaccine hesitancy or vaccine delay, even though it is readily available and accessible, has become a global dilemma [38]. Vaccination acceptance was mainly motivated by belief in vaccine effectiveness and desire to reduce infection risk. Conversely, concerns about potential risks and side effects, and disbelief regarding the vaccine's effectiveness were substantial challenges to vaccination. Many parents have 'vaccine hesitancy' and choose to either delay or not vaccinate their children due to growing concerns that newer vaccines are harmful and not as safe as they use to be. There is also a belief that the ingredients and complications that come with those ingredients are far more harmful than said disease. Thus, health department organisations need to increase vaccine acceptance through education interventions. Our findings also show that amongst the parents who chose not to vaccinate, 70% of their reasoning is due to

the ingredients in the vaccine. Our findings align with other studies that identified similar determinants affecting vaccination intentions [38–39].

Educating parents with evidence-based facts and reassuring them about the safety and efficacy of the chickenpox vaccine will help alleviate these concerns. Healthcare providers and public health authorities are in a critical position to provide reliable information, promote trust, and address vaccine hesitancy among parents [40–42].

Moreover, the study indicated discrepancies in parents' knowledge of chickenpox vaccine symptoms. Some side effects were generally identified, such as skin rash redness, itching, and fever, whereas others including anorexia and headache were less frequently recognized. This highlights the importance of thorough education on the side effects of the vaccine and differentiating these side effects from chickenpox symptoms.

Increasing vaccine compliance is a Public Health and policy issue. From the data collected from studies such as these, we identify the gaps in knowledge and factors contributing to the reluctance in vaccinations. Promoting targeted educational programs and by training healthcare professionals' method of communication can build the trust with parents. Introducing such policy guidelines and strategies create better compliance amongst the community.

## **CONCLUSION**

This study illustrates the need to fill the knowledge gaps and rectify misconceptions about chickenpox and its prevention through vaccination among parents. The results suggest that the willingness of parents to vaccinate their children is associated with various factors, including demographic characteristics, perceptions regarding the disease, beliefs about the chances of reinfection, and attitudes toward the safety and efficacy of the vaccine. Understanding the factors affecting parental attitudes toward vaccination and developing effective evidence-based educational interventions and addressing concerns about vaccine safety and effectiveness are crucial for improving vaccine acceptability and controlling varicella in the community. Healthcare providers, public health authorities, and policymakers play vital roles in informing decision-making and improving vaccination coverage.

Key areas for further investigation include examining the efficacy of educational interventions and investigating other determinants of vaccination decisions. Future research using longitudinal studies to track knowledge, attitudes, and vaccine uptake over time would offer important information to subsequently hone vaccination promotion efforts. A collaborative

effort involving healthcare professionals, public health authorities, community stakeholders, and various other parties can help counter vaccine hesitancy and support

the acceptance of the chickenpox vaccine, ultimately safeguarding the health and well-being of individuals and communities.

### ETHICAL CONSIDERATIONS

The study protocol was reviewed and approved by the College of Pharmacy in the University of Mosul (Session 05 on 02.03.2023). Informed consent was obtained from all participants before data collection. Confidentiality and anonymity of the participants were maintained throughout the study.

### AUTHOR CONTRIBUTIONS

IT and SY designed the study. IT, FR, and SY performed the experiments and collected the data. IT and SY statistically analyzed and wrote the result section. IT, FR, and SY wrote the first draft. All authors discussed the results and revised the final draft before submission.

### FUNDING

None.

### CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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### ARTIFICIAL INTELLIGENCE DISCLOSURE

No AI were used to generate the written text.

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#### INFORMATION ABOUT THE AUTHORS

Islam Tariq

<https://orcid.org/0009-0005-6809-6904>

College of Pharmacy, University of Mosul, Mosul, Iraq

Academic Degree/Job position: MSc in Clinical Pharmacy/Academic Lecturer and Researcher

Farah Ramzi

<https://orcid.org/0009-0009-7360-3746>

College of Pharmacy, University of Mosul, Mosul, Iraq

Academic Degree/Job position: MSc in Clinical Pharmacy/Academic Lecturer and Researcher

Hala F. Kasim

<https://orcid.org/0000-0002-9425-0777>

College of Pharmacy, University of Mosul, Mosul, Iraq

Academic Degree/Job position: MSc in Clinical Pharmacy/Academic Lecturer and Researcher

Salah Yousif

<https://orcid.org/0000-0003-2646-1609>

College of Pharmacy, University of Mosul, Mosul, Iraq

Academic Degree/Job position: PhD in Pharmacology/Academic Reader and Researcher

Suhir M. Rashid

College of Pharmacy, University of Mosul, Mosul, Iraq

Academic Degree/Job position: MSc in Clinical Pharmacy/Academic Lecturer

Luma M. Al-Obaidy

<https://orcid.org/0000-0002-7794-1373>

College of Pharmacy, University of Mosul, Mosul, Iraq

Academic Degree/Job position: MSc in Clinical Pharmacy/Academic Lecturer and Researcher

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