

THE AWARENESS AND PERCEPTIONS OF THE IMPACT OF TONSILLECTOMY ON THE LEVEL OF IMMUNITY AND AUTOIMMUNE DISEASES AMONG THE ADULT POPULATION IN SAUDI ARABIA

Hosam A. Amoodi¹, Joud Shesha^{*2}, Abeer Alanazi³, Sultana Khan⁴, Reuoof Alghamdi², Tif Alghamdi², Fadel Fadel⁵, Manal Alharbi⁶, Hissah Alaiban⁷, Wasan Almohammadi⁸, Khames T. Alzahrani⁹.

¹Assistant Professor, Department of Surgery, College of Medicine, University of Jeddah, Jeddah, Saudi Arabia.

²Medical student, Jeddah university, Jeddah, Saudi Arabia.

³Medical intern, College of Medicine, Tabuk University, Tabuk, Saudi Arabia,

⁴Medical student, Ibn Sina National college for medical studies, Jeddah, Saudi Arabia.

⁵Medical student, King Saud bin Abdulaziz University for Health Sciences, Jeddah, Saudi Arabia.

⁶Medical Intern, Qassim University, Unizah, Saudi Arabia.

⁷Medical intern, Alfaisal University, Riyadh, Saudi Arabia.

⁸Medical intern, Facility of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia.

⁹BDS, PGD Endo from Stanford University, Saudi Board of Endodontic SR, King Faisal Specialist Hospital & Research Centre, Riyadh, Saudi Arabia.

***Corresponding author:** Joud Shesha; **Email:** jouudshishah@hotmail.com

Abstract

Background: Among such widely practiced surgical interventions in children, adenoidectomy and tonsillectomy are certainly performed most frequently, especially when done concomitantly, for recurrent throat infections and related states. Many studies have documented positive short-term consequences of tonsillectomy but there is little understanding of what happens to immune function, and whether those consequences may cause later development of autoimmune diseases in adulthood.

Objective: The aim of this study was to determine the awareness and perceptions of the adult population in Jeddah, Saudi Arabia, with respect to the immune system related effect of tonsillectomy and the association to any autoimmune disease. **Methods:** This was carried out by way of a cross-section survey of a structured questionnaire countered by way of social media platforms from October 2023 to October 2024. It covered the Saudis aged 18 and older, and consisted of 730 adult Saudis. Participants' knowledge, attitudes and beliefs with regard to tonsillectomy's effects on immunity and autoimmune disease were assessed using data collected. **Results:** This demographic analysis showed that 43.6 percent under age 24 and 68.8 percent female. Less direct experience had been with 19.2% who had tonsillectomy. A large proportion (47.7%) were uncertain about the effect of the surgery on respiratory infections, and 40.0% were uncertain about postoperative healthcare visits. Of note, 52.9 % of respondents thought that tonsillectomy is detrimental to the immune function, and 75.6 % did not know much of its concomitant impairment. Results were statistically significant ($P=0.037$) between knowledge levels at one month and educational attainment. **Conclusion:** This confirms that the public

is vastly ignorant when it comes to understanding the long-lasting impacts of tonsillectomy on immunity and autoimmune diseases. The misinterpretation of risks and benefits of the procedure amongst most participants necessitates the use of targeted initiatives aimed at educating them and putting to rest their concerns. Informed decision-making regarding tonsillectomy is of paramount importance, which is made possible through enhanced public education, and will lead to better patient health outcomes and better quality of life.

Keywords: tonsillectomy, immunity, autoimmune diseases, adult.

Introduction:

Tonsillectomy with or without adenoidectomy is one of the most common operations performed on children globally. Its primary indications include recurrent acute streptococcal pharyngotonsillitis, recurrent middle ear infections, hearing impairment, and, in certain cases, periodic fever with aphthous stomatitis, pharyngitis, and adenopathy (PFAPA). These conditions have a substantial impact on the patients' and their families' quality of life (QoL) [1]. Numerous investigations have revealed that tonsillectomy is associated with clinically significant improvements in the health of the patient. After an adenotonsillectomy, asthma in youngsters improved. None of the studies mention long-term results or the development of asthma in adults. It is critical to figure out if the progressive development of allergies in adults correlates with the removal of these organs during childhood [2]. One of the most frequent operations is a tonsillectomy [3]. From 1977 to 1989, the rate of inpatient tonsillectomy decreased by 50%, according to data from the National Hospital Discharge Survey published in 1993 [4]. However, a recent large-scale prospective research of otolaryngology patients' overall health-related quality of life found just a little overall benefit from tonsillectomy [5]. According to previous research, a case-control study was carried out in 2020 to investigate the impact of long-term tonsillectomy on patients' immune systems. It was observed that the case group's mean serum levels of IgM, IgA, and IgG were significantly ($P = 0.0001$) lower than those of the control group [6]. Unfortunately, only a few studies have studied the public awareness and perceptions of the effect of tonsillectomy on the immune system. In 2023 descriptive cross-sectional research of adults in Abha city, about 36% of study participants believed that tonsillectomy influences immunity. Only 18% of research participants believed that autoimmune disorders and tonsillectomy are related [7]. Several factors were suspected to influence the quality of life among patients who undergone a tonsillectomy, in 2023 Ying Zhou et al conducted a cross-sectional survey to investigate that, the result showed that patients who underwent tonsillectomy had a relatively moderate score of 64.36 ± 18.21 in Physiological function regarding their quality of life and age $\leq 5y$, courses of tonsillitis ≥ 3 years, parental education level at high school, and monthly family income ≤ 5000 RMB and monthly family income > 5000 RMB were the independent variables that influenced the quality of life in children who underwent tonsillectomy (all $P < 0.05$) [8]. The current study set out to assess the effectiveness of tonsillectomy in people with recurrent tonsillitis as well as how it affected the burden on healthcare. Previous research that assessed immunoglobulin and complement levels found no evidence of immune system damage after tonsillectomy in pediatric patients. There is no strong evidence that adult tonsillectomy increases the risk of other infectious or inflammatory disorders or has any effect on immunologic state. The purpose of this study was to look into how patients' immune systems were affected by long-term tonsillectomy. to investigate the link

between pediatric tonsillectomy and the risks of developing certain comorbidities afterward. The aim of conducting this study is that there is no strong evidence that tonsillectomy increases the risk of other infectious or inflammatory disorders or has any effect on immunologic state.

Objective:

Our aim in this study was to assess the awareness and perceptions of the impact of tonsillectomy on the level of immunity and autoimmune diseases among the adult population in Jeddah city, Kingdom of Saudi Arabia.

Materials and Methods:**Study design:**

This study was a cross-sectional questionnaire survey, based on a structured questionnaire that was developed by author. Community based: among adult population in Jeddah City, KSA. the study conducted during October 2023 to December 2024.

Participants, recruitment, and sampling procedure:

The study's population consisted of Saudi adults over the age of 18, participants were recruited during 2023-2024 from people receiving the questionnaire.

Inclusion and Exclusion criteria:

Inclusion Criteria for this study are as follow :1) the Adult Population, aged 18 years and above; 2) Residents of Jeddah City, Kingdom of Saudi Arabia; 3) individuals with History of Tonsillectomy at any point in their lives; 4) Both Genders, Both males and females included in the study; 5) Both Individuals who have undergone tonsillectomy procedures or not; 6) Both Individuals with a history of autoimmune diseases or not; 7) Willingness to Participate voluntarily agree to participate in the research study and provide informed consent.

Exclusion Criteria for this study are as follow :1) Minors, below 18 years of age; 2) Non-Residents of Jeddah City, Kingdom of Saudi Arabia; 3) Participants who are unable to provide informed consent, such as those with cognitive impairments; 4) Healthcare Professionals or individuals with a medical background related to the topic of tonsillectomy and immunity; 5) Individuals with cognitive or communication impairments that hinder meaningful responses.

Sample size:

The sample size was estimated by using the Qualtrics calculator with a confidence level of 95%; the minimum sample size 384.

Method for data collection and instrument (*Data collection Technique and tools*):

In order to accomplish the objective of this study, a questionnaire was disseminated to adults in Jeddah via various social media platforms. The questionnaire aimed to assess their awareness level concerning the procedure and its impact on immune system functionality. Subsequently, the obtained questionnaire

results were entered into a data collection sheet. Finally, the collected data underwent analysis to draw meaningful conclusions and insights.

Scoring system:

Overall, nineteen statements were used to assess the level of Awareness and perception of the impact of tonsillectomy on the level of immunity and autoimmune diseases. Awareness score: Nine statements for Awareness scoring, one point given for correct answers, and zero points for incorrect answers or I don't know. The scoring system was divided as follows: ≥ 7 for a high- level of knowledge, 4-6 for a medium-level of knowledge, and ≤ 3 for low-level of knowledge. perception score: A total of 10 statements were used to assess the perception towards tonsillectomy impact on the level of immunity and autoimmune diseases,

using five statements for each one. A six-point Likert scale used and regarded from 5-0 as strong positive to I don't know. The score ≥ 21 considered a positive perception, 13-20 considered a neutra perception 1, and < 12 considered a negative perception. For each correct answer, a score of 1 considered. A score of "0" was provided for an incorrect response, and a response "I don't know" similarly considered wrong and received a score of "0". Then the total score well be calculated. The second section is to determine the level of awareness regarding of the impact tonsillectomy and the level of immunity. Subsequently, respondents' awareness was divided into three categories: low knowledge (0–4), average knowledge (5-7), and good knowledge (8-10). The third section is to determine the level of awareness regarding impact of tonsillectomy and the level of autoimmune diseases. Subsequently, respondents' awareness well be divided into three categories: low knowledge (0–8), average knowledge (9-12), and good knowledge (13-16)

Analyzes and entry method:

Data was input using the Microsoft Excel application for Windows (2016) after being collected. The Statistical-Package of Social-Science Software (SPSS) application, version 20, was then used to import the data. to undergo statistical evaluation.

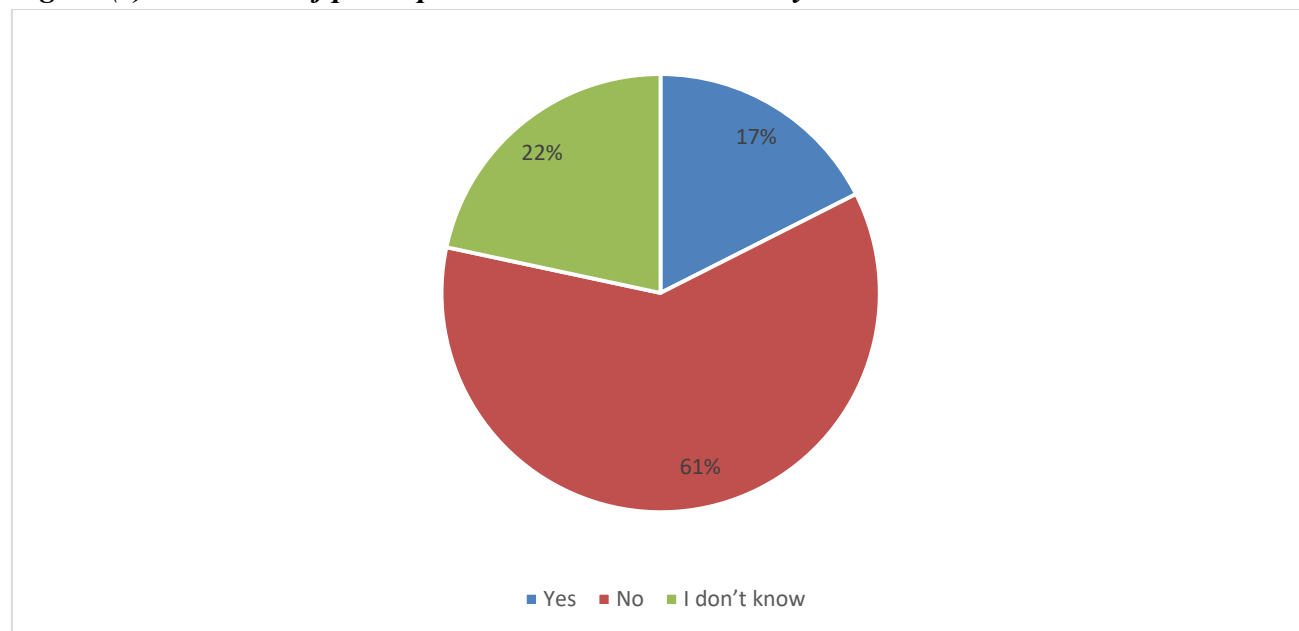
Results:

The number of participants with a total number of (730) is shown in Table (1) for various demographic parameters of the participants. The age distribution of particular peculiarities, is a young demographic, with over 43.6% of participants aged 24 or younger. A majority (68.8%) of participants in the study are female and Saudi nationals (94.3%), which may have an effect on the findings of any following research. A single population is mainly shown (57.3% which may have discourse with social dynamics and economic behaviour within this group). A portion of the income distribution (49.0%) shows that 48.6% of participants belong to the income bracket of 0-3000, indicating an economic situation of many participants. In relation to education, a big share goes into obtaining a bachelor's degree (52.9%), which may even point out towards education level achieved of enough to permit professional chances and social mobility. Spatial distribution shows that the majority is located in the Western region (62.7%), possibly as a result of urbanization trends, future resource allocation patterns and other occurrences.

Table (1): Sociodemographic characteristics of participants (n=730)

<i>Parameter</i>		<i>No.</i>	<i>Percent (%)</i>
<i>Age</i>	22 or less	154	21.1
	23 to 24	164	22.5
	25 to 30	110	15.1
	31 to 45	162	22.2
	more than 45	140	19.2
<i>Gender</i>	Female	506	68.8
	Male	230	31.3
<i>Nationality</i>	Saudi	694	94.3
	Non-Saudi	42	5.7
<i>Marital status</i>	Single	418	57.3
	Married	282	38.6
	Divorced	26	3.6
	Widowed	4	.5
<i>Monthly income</i>	0- 3000	358	49.0
	4000-8000	124	17.0
	9000-15000	142	19.5
	More than 15000	106	14.5
<i>Region</i>	Northern region	38	5.2
	Southern region	76	10.4
	Central region	98	13.4
	Eastern region	60	8.2
	Western region	458	62.7
<i>Education level</i>	Primary school	8	1.1
	Middle school	12	1.6
	High school	204	27.9
	Diploma	72	9.9
	Bachelor's degree	386	52.9
	Postgraduate degree	48	6.6

As shown in figure 1, the data presented indicates a notable disparity between adults and children in terms of surgical intervention. Of the total responses, only 128 individuals affirmed that tonsillectomy is more common in adults, representing approximately 18.7% of the total respondents. In stark contrast, the majority, 444 participants, believed that tonsillectomy is less common in adults, accounting for about 64.7%. Additionally, a significant portion, comprising 158 respondents or roughly 23.6%, expressed uncertainty regarding this matter.

Figure (1): Illustrates if participants think that tonsillectomy is more common in adults.

From table (2) we can see that the data provides a comprehensive view of the impact of tonsillectomy to immunity among the people through a 730 participant's sample. Surprisingly, only 19.2% had tonsillectomy, suggesting that the limited direct experience of the sample is not particularly notable. About 47.7% of them showed uncertainty in postoperative susceptibility to upper respiratory tract diseases, indicating generally uncertainty with regard to the longterm impact on health. Along with that, 60.8% of people were against the idea that tonsillectomy is more common in people above 18 years than people under. Interestingly, but 65.5% of respondents could not define the relationship between the tonsillectomy and the immune response regarding the massive change of serum levels of immunoglobulins (IgM, IgG, IgA). Postoperative complications concerns are also perceived as they are 40.0% uncertain about more visits to healthcare providers post-surgery.

Table (2): Parameters related to knowledge about the impact of tonsillectomy on immunity (n=730).

Parameter		No.	Percent (%)
<i>Have you had a tonsillectomy?</i>	Yes	140	19.2
	No	584	80.0
	I don't know	6	.8
<i>Are post-tonsillectomy patients more susceptible to upper respiratory tract diseases?</i>	Yes	250	34.2
	No	132	18.1
	I don't know	348	47.7
<i>Is tonsillectomy more common in adults than children?</i>	Yes	128	17.5
	No	444	60.8
	I don't know	158	21.6
<i>Are the serum levels of IgM, IgG, and IgA remarkably reduced in patients undergoing tonsillectomy?</i>	Yes	122	16.7
	No	130	17.8

	I don't know	478	65.5
<i>Is there any repeated short term throat infection that last more than 2 weeks?</i>	Yes	224	30.7
	No	178	24.4
	I don't know	328	44.9
<i>Did you visit family doctor or emergency department a lot of time?</i>	Yes	46	6.3
	No	392	53.7
	I don't know	292	40.0
<i>Do you have poor appetite after tonsillectomy at long term?</i>	Yes	56	7.7
	No	294	40.3
	I don't know	380	52.1
<i>Are there any difficulties in sleep after tonsillectomy?</i>	Yes	44	6.0
	No	290	39.7
	I don't know	396	54.2
<i>Is there constant earache or ear infection after tonsillectomy?</i>	Yes	50	6.8
	No	272	37.3
	I don't know	408	55.9
<i>Do you think tonsillectomy affects immunity?</i>	Yes	272	37.3
	No	208	28.5
	I don't know	250	34.2
<i>Do you think there is a relationship between tonsillectomy and autoimmune diseases (the body attacks itself)?</i>	Yes	196	26.8
	No	238	32.6
	I don't know	296	40.5
<i>Based on your knowledge of the relationship of tonsillectomy with immunity, have you decided not to get operated on yourself or any of your relatives?</i>	Yes	154	21.1
	No	376	51.5
	I don't know	200	27.4

As shown in figure (2), Out of the total 730 respondents, a notable 204 individuals, accounting for approximately 27.9%, indicated that they believe tonsillectomy is a risk factor for developing allergic conditions. In contrast, a majority of 356 respondents, comprising about 48.8%, asserted that they do not perceive any such risk associated with the procedure. Furthermore, a significant portion, represented by 170 participants, or around 23.3%, expressed uncertainty regarding this relationship.

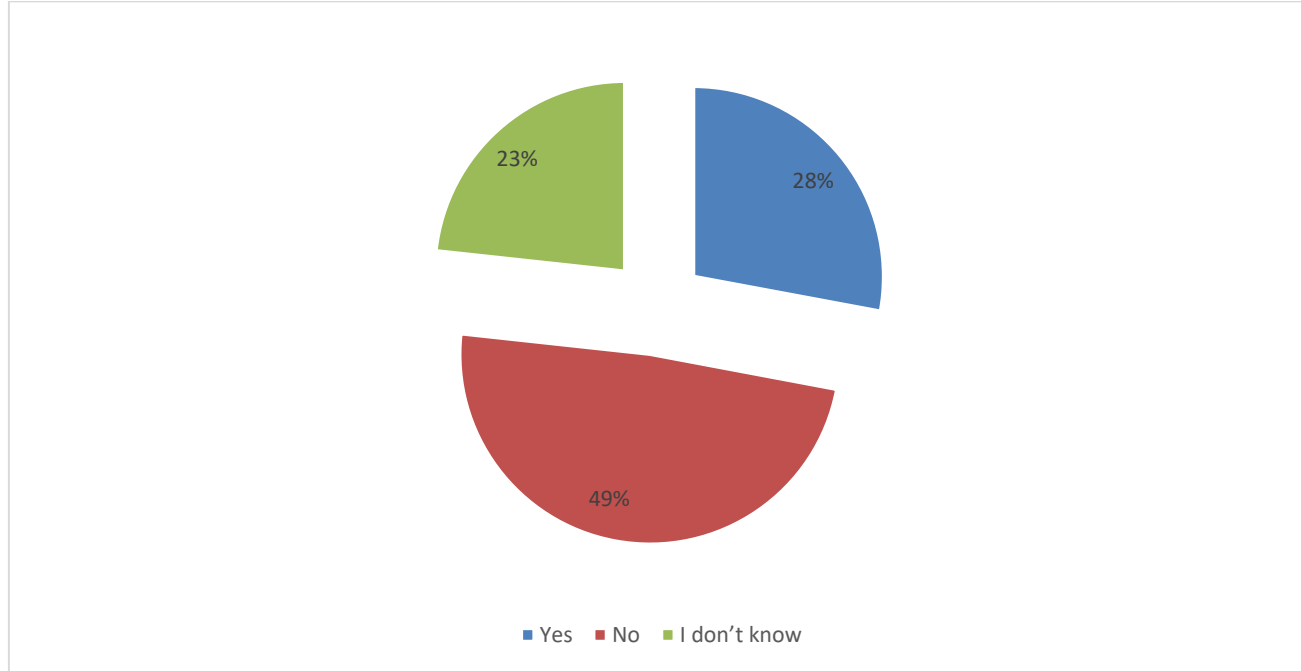
Figure (2): Illustrates whether participants think tonsillectomy is a risk factor for allergic diseases.

Table (3) shows a part of the analysis performed on the 730 participants' perception of the consequences of tonsillectomy on their immunity. The findings are notable partly because of significant variability in total tonsillitis episodes post-surgery, including 118 (31.2%) of participants reporting three episodes, a relevant point considering the procedure's effectiveness in improving overall health. This is also true for upper respiratory tract infection (URTIs) where 26.3% reported three episodes of disease, suggesting possible limits in perceived immunological benefit after tonsillectomy. Antibiotic analysis demonstrates that post operatively 23.8% of patients require two or three additional courses of antibiotics, suggesting continued infection management challenges. Data on hospital rates indicate that 24.9 percent of participants had no hospitalization following the procedure, but large portions suffered multiple hospitalizations, suggesting a complex recovery path.

Table (3): participants' perception towards the impact of tonsillectomy on immunity (n=730).

Parameter		No.	Percent (%)
Total tonsillitis episodes after tonsillectomy	0	182	24.9
	1	84	11.5
	2	158	21.6
	3	228	31.2
	4	42	5.8
	5	36	4.9
Total URTI episodes after tonsillectomy	0	178	24.4
	1	102	14.0
	2	162	22.2
	3	192	26.3

	4	58	7.9
	5	38	5.2
<i>Average antibiotic prescriptions per patient after tonsillectomy</i>	0	150	20.5
	1	106	14.5
	2	174	23.8
	3	174	23.8
	4	72	9.9
	5	54	7.4
<i>Total hospitalization after tonsillectomy</i>	0	182	24.9
	1	132	18.1
	2	176	24.1
	3	164	22.5
	4	48	6.6
	5	28	3.8
<i>Average primary care office visits per patient before and after surgery</i>	0	210	28.8
	1	142	19.5
	2	142	19.5
	3	168	23.0
	4	32	4.4
	5	36	4.9
<i>Total hospitalization to the ENT department after tonsillectomy</i>	0	162	22.2
	1	134	18.4
	2	174	23.8
	3	166	22.7
	4	58	7.9
	5	36	4.9

As shown, Table 4 affords participants a means to digest how they feel and think about tonsillectomy and its potential to affect immunity as well as overall health. 48.8 percent, or a substantial majority, believe that tonsillectomy is not a risk factor for allergic diseases suggesting a prevailing skepticism of its relationship to allergic diseases. Nevertheless, 56.2% of participants were unsure about long term risk after tonsillectomy, which indicates the requirement for greater education and awareness surrounding the procedure itself. Immunological disorders, were considered a potential long term risk by a notable number of respondents (13.4 percent), emphasising that this deserves further investigation. Responses also varied concerning the effects of adenotonsillectomy on the life quality of children, as a large proportion of them (350 respondents) indicated what is uncertain.

Table (4): participants' attitude and practice towards the impact of tonsillectomy on immunity (n=730).

<i>Parameter</i>		<i>No.</i>	<i>Percent (%)</i>
<i>Is tonsillectomy a risk factor for allergic diseases?</i>	Yes	204	27.9
	No	356	48.8
	I don't know	170	23.3
<i>What are the post-tonsillectomy long term risks? *</i>	Asthma	4	0.5
	Inflammation	48	6.6
	Bleeding	2	0.3
	loss of taste	2	0.3
	Dyspepsia	2	0.3
	Hyperorexia	2	0.3
	Immunological disorders	98	13.4
	Thyroid diseases	2	0.3
	Discomfort	2	0.3
	Vocal disorders	4	0.5
	Infection	30	4.1
	URTI	24	3.3
	Obesity	14	1.9
	I don't know	410	56.2
	None	100	13.7
<i>What is the spectrum of pathological findings of tonsils in adults?</i>	High	78	10.7
	Average	64	8.8
	Low	100	13.7
	None	30	4.1
	I don't know	458	62.7
<i>What is the impact of adenotonsillectomy in the pediatric quality of life? *</i>	Better effect	172	23.6
	Better sleep	18	2.5
	Growth effect	2	0.3
	High impact	2	0.3
	Worse	26	3.6
	Immunological disorders	2	0.3
	Improve their breathing	4	0.5
	No big difference	14	1.9
	Obesity	18	2.5
	Pain	8	1.1
	Prone to infection	56	7.7
	I don't know	350	47.9
	None	76	10.4

<i>What is the effect of tonsillectomy on the morbidity from recurrent tonsillitis? *</i>	Bleeding	2	0.3
	Chronic fatigue	2	0.3
	Costly High resources	2	0.3
	Excellent	12	1.6
	Immunological disorders	20	2.7
	Improved quality of life	6	0.8
	Lower the incidence of inflammation	2	0.3
	Interrupted sleep	2	0.3
	Lower the incidence of infection	4	0.5
	More inflammation	16	2.2
	Obesity	6	0.8
	Others	18	2.5
	More Pain	6	0.8
	Relief from pain and inflammation	154	21.1
	Repeated infection	18	2.5
	Stomach side effects	4	0.5
	I don't know	400	54.8
	No effect	54	7.4
<i>What is the extent of any derived health benefits from tonsillectomy? *</i>	Better eating and drinking	6	0.8
	Better growth	2	0.3
	Better sleep and rest	54	7.4
	Excellent	8	1.1
	Few	2	0.3
	Less illness	2	0.3
	Less infection and inflammation	238	32.6
	Lower fever rates	2	0.3
	Lower risk of recurrence	2	0.3
	Many	30	4.1
	Protecting from heart diseases and rheumatic diseases	16	2.2
	None	32	4.4
	I don't know	336	46.0

****Results may overlap***

Having put all of the data presented in Table 5 together can tell us just how much education we have from a sample of 730 respondents as to the impact of tonsillectomy on immunity and auto immune scores. In particular, a great majority, 75.6% of participants, had a very poor level of knowledge associated with this critical surgical procedure and its immunological importance. The fact that less than half (5.5%) were able to demonstrate a high level of knowledge regarding the effects of tonsillectomy on the immune system highlights such a large chasm in proper education regarding the effects of tonsillectomy on the immune system. 18.9% represented the intermediate knowledge level, signifying awareness of part of the issue but not enough to allow informed decision making or patient education.

Table (5): Shows knowledge about the impact of tonsillectomy on the level of immunity and autoimmune diseases score results.

	Frequency	Percent
High level of knowledge	40	5.5
Medium level of knowledge	138	18.9
Low level of knowledge	552	75.6
Total	730	100.0

The data presented in Table 6 delineates the perceptions surrounding the impact of tonsillectomy on immunity and the incidence of autoimmune diseases among a cohort of 730 respondents. Notably, a considerable majority of 52.9% express a negative perception regarding the surgery's effects on immune function, suggesting a prevalent concern that the removal of tonsils may detrimentally influence the body's defenses against pathogens. Conversely, only 9.0% of respondents maintain a positive perception, indicating a significant divergence in beliefs about the relationship between tonsillectomy and immune health. Furthermore, the 38.1% of individuals who hold a neutral stance reflect a degree of uncertainty or ambivalence, highlighting the complexities and varied narratives associated with this surgical intervention.

Table (6): Shows perception about the impact of tonsillectomy on the level of immunity and autoimmune diseases score results.

	Frequency	Percent
Positive perception	66	9.0
Neutral perception	278	38.1
Negative perception	386	52.9
Total	730	100.0

The findings presented in Table 7 reveal a significant discrepancy in the attitudes towards the impact of tonsillectomy on immunity and the incidence of autoimmune diseases among the study participants. With only 36.7% of respondents exhibiting a proper attitude toward the implications of tonsillectomy, it is evident that a substantial majority, comprising 63.3%, hold no established attitude regarding this surgical procedure's effects on immune function and related health conditions.

Table (7): Shows attitude about the impact of tonsillectomy on the level of immunity and autoimmune diseases score results.

	Frequency	Percent
Proper attitude	268	36.7
No attitude	462	63.3
Total	730	100.0

Table (8) shows that the knowledge level about the impact of tonsillectomy has statistically significant relation to education level (P value=0.037). It also shows statistically insignificant relation to gender, age, nationality, marital status, monthly income, and region.

Table (8): Relation between knowledge level about the impact of tonsillectomy on the level of immunity and autoimmune diseases and sociodemographic characteristics.

Parameters		Knowledge level		Total (N=730)	P value*
		High or moderate knowledge	Low level of knowledge		
Gender	Female	128	374	502	0.298
		71.9%	67.8%	68.8%	
	Male	50	178	228	
		28.1%	32.2%	31.2%	
Age	22 or less	50	104	154	0.055
		28.1%	18.8%	21.1%	
	23 to 24	30	134	164	
		16.9%	24.3%	22.5%	
	25 to 30	28	82	110	
		15.7%	14.9%	15.1%	
	31 to 45	36	126	162	
		20.2%	22.8%	22.2%	
Nationality	Saudi	172	516	688	0.116
		96.6%	93.5%	94.2%	
	Non-Saudi	6	36	42	
		3.4%	6.5%	5.8%	
Marital status	Single	108	310	418	0.526
		60.7%	56.2%	57.3%	
	Married	64	218	282	
		36.0%	39.5%	38.6%	
	Divorced	6	20	26	
		3.4%	3.6%	3.6%	

	Widowed	0	4	4	
		0.0%	0.7%	0.5%	
Monthly income	0- 3000	78	280	358	0.241
		43.8%	50.7%	49.0%	
	4000-8000	38	86	124	
		21.3%	15.6%	17.0%	
	9000-15000	34	108	142	
		19.1%	19.6%	19.5%	
	More than 15000	28	78	106	
		15.7%	14.1%	14.5%	
Region	Northern region	12	26	38	0.543
		6.7%	4.7%	5.2%	
	Southern region	18	58	76	
		10.1%	10.5%	10.4%	
	Central region	24	74	98	
		13.5%	13.4%	13.4%	
	Eastern region	10	50	60	
		5.6%	9.1%	8.2%	
	Western region	114	344	458	
		64.0%	62.3%	62.7%	
Education level	Primary school	0	8	8	0.037
		0.0%	1.4%	1.1%	
	Middle school	4	8	12	
		2.2%	1.4%	1.6%	
	High school	52	152	204	
		29.2%	27.5%	27.9%	
	Diploma	8	64	72	
		4.5%	11.6%	9.9%	
	Bachelor's degree	104	282	386	
		58.4%	51.1%	52.9%	
	Postgraduate degree	10	38	48	
		5.6%	6.9%	6.6%	

***P value was considered significant if ≤ 0.05 .**

Table (9) shows that the knowledge level about the impact of tonsillectomy has statistically significant relation to education level (P value=0.001) and age (P value=0.0001). It also shows statistically insignificant relation to gender, nationality, marital status, monthly income, and region.

Table (9): Relation between perception level about the impact of tonsillectomy on the level of immunity and autoimmune diseases and sociodemographic characteristics.

<i>Parameters</i>		<i>Perception level</i>		<i>Total (N=730)</i>	<i>P value*</i>
		Negative perception	Positive neutral or		
<i>Gender</i>	Female	268	234	502	0.682
		69.4%	68.0%	68.8%	
	Male	118	110	228	
		30.6%	32.0%	31.2%	
<i>Age</i>	22 or less	58	96	154	0.0001
		15.0%	27.9%	21.1%	
	23 to 24	104	60	164	
		26.9%	17.4%	22.5%	
	25 to 30	66	44	110	
		17.1%	12.8%	15.1%	
	31 to 45	92	70	162	
		23.8%	20.3%	22.2%	
	more than 45	66	74	140	
		17.1%	21.5%	19.2%	
<i>Nationality</i>	Saudi	358	330	688	0.065
		92.7%	95.9%	94.2%	
	Non-Saudi	28	14	42	
		7.3%	4.1%	5.8%	
<i>Marital status</i>	Single	222	196	418	0.193
		57.5%	57.0%	57.3%	
	Married	144	138	282	
		37.3%	40.1%	38.6%	
	Divorced	16	10	26	
		4.1%	2.9%	3.6%	
	Widowed	4	0	4	
		1.0%	0.0%	0.5%	
<i>Monthly income</i>	0- 3000	194	164	358	0.125
		50.3%	47.7%	49.0%	
	4000-8000	74	50	124	
		19.2%	14.5%	17.0%	
	9000-15000	70	72	142	
		18.1%	20.9%	19.5%	
	More than 15000	48	58	106	
		12.4%	16.9%	14.5%	
<i>Region</i>	Northern region	18	20	38	0.238
		4.7%	5.8%	5.2%	
	Southern region	32	44	76	

Education level	Central region	8.3%	12.8%	10.4%	0.001
		52	46	98	
	Eastern region	13.5%	13.4%	13.4%	
		36	24	60	
	Western region	9.3%	7.0%	8.2%	
		248	210	458	
		64.2%	61.0%	62.7%	
	Primary school	8	0	8	
		2.1%	0.0%	1.1%	
	Middle school	4	8	12	
		1.0%	2.3%	1.6%	
	High school	88	116	204	
		22.8%	33.7%	27.9%	
	Diploma	42	30	72	
		10.9%	8.7%	9.9%	
	Bachelor's degree	220	166	386	
		57.0%	48.3%	52.9%	
	Postgraduate degree	24	24	48	
		6.2%	7.0%	6.6%	

***P value was considered significant if ≤ 0.05 .**

Table (10) shows that the knowledge level about the impact of tonsillectomy has statistically significant relation to education level (P value=0.001), marital status (P value=0.0001), monthly income (P value=0.049) and age (P value=0.0001). It also shows statistically insignificant relation to gender, nationality, and region.

Table (10): Relation between attitude level about the impact of tonsillectomy on the level of immunity and autoimmune diseases and sociodemographic characteristics.

Parameters		Attitude level		Total (N=730)	P value*
		No attitude	Proper attitude		
Gender	Female	326	176	502	0.169
		70.6%	65.7%	68.8%	
	Male	136	92	228	
		29.4%	34.3%	31.2%	
Age	22 or less	94	60	154	0.0001
		20.3%	22.4%	21.1%	
	23 to 24	120	44	164	
		26.0%	16.4%	22.5%	
	25 to 30	76	34	110	
		16.5%	12.7%	15.1%	

	31 to 45	104	58	162	
		22.5%	21.6%	22.2%	
	more than 45	68	72	140	
		14.7%	26.9%	19.2%	
Nationality	Saudi	434	254	688	0.640
		93.9%	94.8%	94.2%	
	Non-Saudi	28	14	42	
		6.1%	5.2%	5.8%	
Marital status	Single	278	140	418	0.0001
		60.2%	52.2%	57.3%	
	Married	158	124	282	
		34.2%	46.3%	38.6%	
	Divorced	24	2	26	
		5.2%	0.7%	3.6%	
	Widowed	2	2	4	
		0.4%	0.7%	0.5%	
Monthly income	0- 3000	238	120	358	0.049
		51.5%	44.8%	49.0%	
	4000-8000	84	40	124	
		18.2%	14.9%	17.0%	
	9000-15000	82	60	142	
		17.7%	22.4%	19.5%	
	More than 15000	58	48	106	
		12.6%	17.9%	14.5%	
Region	Northern region	28	10	38	0.087
		6.1%	3.7%	5.2%	
	Southern region	40	36	76	
		8.7%	13.4%	10.4%	
	Central region	62	36	98	
		13.4%	13.4%	13.4%	
	Eastern region	44	16	60	
		9.5%	6.0%	8.2%	
Education level	Primary school	288	170	458	0.003
		62.3%	63.4%	62.7%	
	Middle school	2	6	8	
		0.4%	2.2%	1.1%	
	High school	4	8	12	
		0.9%	3.0%	1.6%	
	High school	122	82	204	
		26.4%	30.6%	27.9%	

	Diploma	56	16	72	
		12.1%	6.0%	9.9%	
	Bachelor's degree	250	136	386	
		54.1%	50.7%	52.9%	
	Postgraduate degree	28	20	48	
		6.1%	7.5%	6.6%	

**P value was considered significant if ≤ 0.05 .*

Discussion:

ENT surgeons do tonsillectomy for some indications one of the common surgeries. Then, the researchers go on to suggest that tonsils do have a major role to play in immunity evolution and thus their tonsillectomy causes change in our immune system. Researchers also suggest that the risk of developing autoimmune diseases may increase because of a tonsillectomy [11]. Tonsillar tissues serve as first line of immune system defence against organisms, allergens and even food [12] We therefore aimed to assess the awareness and perception of what tonsillectomy means regarding the immune system level and autoimmune diseases in adult population of jeddah city, kingdom of Saudi Arabia.

This current study gives a thorough investigating of the present study of public perceiving the imponderability of a tonsillectomy on the invulnerability, which check and opposed with different research. The direct experience with tonsillectomy by the three major centers was limited in our cohort of 730 participants, where only 19.2% had undergone the procedure. This is in line with what other studies found out which showed that tonsillectomy is done mostly in younger groups, specifically, in children, as indicated by Tran AH et al [13], who found that tonsillectomy is done in about 74.7 per cent of children, aged 5 to 9 years. In addition, our results suggest a large uncertainty regarding whether the tonsillectomy actually protects against developing upper respiratory tract infections, with 47.7% of participants uncertain about the long term health implications associated with tonsillectomy. This is similar to Tai KH et al [14] who commented that parents worried about recurring illnesses in their children following tonsillectomy. Our data also suggests that nearly half of participants believe that tonsillectomy had little to no chance of efficacy due to their multiple episodes of tonsillitis and upper respiratory infections post surgery that resulted in 3 episodes of tonsillitis (31.2%). This finding is consistent with earlier literature that indicates that, while tonsillectomy helps to improve quality of life and reduce the incidence of infections in some patients, others will continue to have recurrent infections post-operatively [15]. A notable feature of our study is that 23.8% of the participants obtained multiple courses of antibiotics after tonsillectomy, a continued source of infection management challenges, as evidenced by prior studies demonstrating differing postoperative effects on immune function and infection rates [16, 17].

Our striking finding was public belief that tonsillectomy may involve autoimmune diseases, and that a majority of respondents held concern regarding this link. Research from Sweden confirms this perception of an elevated standardized incidence ratio (SIR) of autoimmune diseases associated with tonsillectomy [11]. Nevertheless, conflicting evidence exists, with some studies finding no significant long term effects on humoral immunity after the procedure [18] while others report only minor immune parameters decrease which yield normal ranges [19]. These discrepancies dramatize the ongoing

controversy over the immunological outcomes of tonsillectomy and call for further study of the underlying mechanisms. Our results are interesting as we found that 52.9% of the respondents have a negative perception about the effect of the tonsillectomy on immune function whilst 9.0% of them have a positive perception about the impact. Similarly, in literature many patients and parents doubt the utility of the surgery unless there are potential adverse effects on immunity [14]. In addition, in our study knowledge about the effect of tonsillectomy on immunity is strongly associated with education level: 75.6 percent of participants did not understand the effect of tonsillectomy on immunity. This finding is consistent with the finding that many people lack understanding and awareness of surgical interventions in general, especially in the case of tonsillectomy, where the information is often heavily dependent on community members and social media for dissemination [20]. Moreover, our study's statistical analysis revealed significant relationships between knowledge levels and various demographic factors such as education level, age, and marital status, suggesting that targeted educational interventions may be beneficial in improving public understanding of tonsillectomy and its implications for health. This aligns with findings from other studies that emphasize the importance of effective communication and education in enhancing patient-centered care and addressing misconceptions surrounding surgical procedures [20].

Conclusion:

Finally, in this study we showed considerable gap in the awareness and comprehension of the influence of tonsillectomy on immune function in autoimmune diseases in Jeddah City adult population in Saudi Arabia. While the procedure is common, only 19.2% of participants had ever had a tonsillectomy personally, raising widespread uncertainty regarding the procedure's long term health consequences. Remarkably, only 74.1% of respondents showed poor knowledge of the surgical procedure and suggest the urgent need of targeted educational intervention. There were worries about the effects that tonsillectomy might have on immunity, on the one hand, and the effects tonsillectomy could have on autoimmune diseases, on the other, with 52.9% of those surveyed having negative opinions about the effects it would have on immunity. The implication of these findings is that any effort aimed at improving public education on the implications of tonsillectomy, tackling misconceptions, and encouraging informed decision making, would become more salient. The long term immunological consequences of tonsillectomy should be elucidated in future research, and the community should be educated to help achieve better health outcomes.

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Ethical approval

An informed consent was obtained from each participant after explaining the study in full and clarifying that participation is voluntary. Data collected were securely saved and used for research purposes only.

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Conflict of interests

The authors declare that there are no conflicts of interest.

Informed consent:

Written informed consent was obtained from all individual participants included in the study.

Data and materials availability

All data associated with this study are present in the paper.

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