

# Medical Students' Perception Towards Choosing Pathology Program at Jazan University, Saudi Arabia

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**Purpose:** The selection of a specific medical specialty is crucial to medical students and is increasingly associated with future job satisfaction and success in the medical field. We aim to evaluate the perception of medical students at Jazan University towards choosing pathology as a future career and the factors influencing their decisions in order to better the employability of graduates and provide information to both the labor force and curriculum designers.

**Methods:** An observational cross-sectional study was conducted among a random sample of (391) students at the faculty of medicine, Jazan University, from the 2nd to 6th year who registered as a formal student in the academic year 2021/2022. Data was collected via (web-based) a self-administered questionnaire because of COVID-19 pandemic. Chi-squared tests and regression analysis were performed.

**Results:** In this investigation, 92.9% of participants responded. Only 16.2% of undergraduates selected pathology as a future career choice. Among the participants who desired to choose pathology as a career, 28.6% preferred hematopathology as a future sub-specialty. Around 16% considered the most crucial reason for not choosing pathology is the preference for direct patient contact. The differences in age groups, academic level, GPA, and educational level of father between respondents who having a desire to choose pathology as a future career were found to be significantly different.

**Conclusion:** Among the respondents involved in this study, only 16.2% were interested in pathology, while 3.1% chose the field as their first future career choice. Our findings can be applied to help undergraduate better prepare for the future and encourage them to apply to the pathology program to address the shortage of pathologists in the area. Qualitative research is a need to explore the perceptions of current pathology residents and the reasons that can encourage them to choose this important specialization as a future career.

**Keywords:** undergraduate, career choice, pathology, digital pathology, medical curriculum, Jazan, Saudi Arabia

## Introduction

The selection of a specific medical specialty is crucial to medical students and is increasingly associated with future job satisfaction and success in the medical field. Research suggested that a group of factors are responsible for the specialty choices among medical students. They range from individual characteristics to factors associated with medical curricula, perceived benefits, and the attraction of specific specialties.<sup>1-5</sup>

It is crucial in assessing the potential availability of doctors in various specialties as well as the workforce preparing for healthcare. Furthermore, a previous study found that students in the clinical phase of medical school are more likely than those in the basic sciences phase to choose a potential medical specialty.<sup>1</sup> As a result of the introduction of many new subspecialties within conventional specialties, the range of career opportunities open to a medical graduate has expanded much further.<sup>2</sup>

Pathology is a medical discipline that establishes the scientific basis for all medical practice. The pathologist collaborates with all other medical specialties, using laboratory medicine methods (histology, cytology, biochemistry, molecular biology, and so on) to provide knowledge critical to clinical problem solving. The field of pathology allows one to choose a niche that fits his or her unique interests and needs due to its diverse and heterogeneous existence.<sup>3</sup>

The Faculty of Medicine, Jazan University (FOM, JU) was established in 2001, which adopted the integrated organ-system curriculum with community orientation. Three years ago, the Curriculum was reformed at the FOM, JU with a shift towards Competency-based type.

Teaching Pathology is limited to the second and third years, mainly in the organs system modules. This is conducted in the form of One-hour lectures, 2–3 times per week as well as Practical sessions and small group learning, mainly problem-based learning. Students in the 2nd year begin their encounter with Pathology in Foundation II module where teaching is centered around themes. After that Pathology is taught in all consequent modules up to third year.

Optional elective courses are offered at the end of third year. These are Cytopathology, Immunohistochemistry and Laboratory Medicine. The latter mainly focuses on Clinical Pathology. The total number of Contact Hours amounts to 415 in theoretical parts, whilst Practical sessions comprise 48 hours. Keeping in mind that morphological observation of specimens is highly significant to the learning and teaching of pathology curricula.<sup>4</sup> This is the last encounter of students with pathology until they graduate. This gap could negatively influence the willingness of the graduates to apply for pathology clerkship programs.<sup>5,6</sup> Factors that influence career decisions have been reported from medical colleges around the globe and other parts of KSA.<sup>2–5,8–17</sup> The reason behind declining in applying to pathology program may be due to many reasons, including less patient interaction and the lack of visibility of Pathology as a discipline in the senior years, as well as the preference of medical students in choosing clinical specialties over Basic sciences where their perception as being Real doctors is overshadowed if they choose Pathology as a specialty.

The current pandemic has forced the National Health Service (NHS) to respond quickly to several challenges, one of which is the recommendation to operate remotely wherever possible. In this sense, histopathology poses its own set of difficulties, partially because certain aspects of the work, such as the handling of surgical and cytology specimens, simply cannot be performed remotely.<sup>7</sup> The introduction of digitized images to pathology, on the other hand, has propelled this conventional discipline into what is now known as digital pathology (DP). Digital images and video streams can be exchanged in real time, bridging the physical divide (telepathology) between local clinics, colleges (second opinions), teachers and students, and home and workplace (home-office).<sup>8</sup>

To combat the trend of declining applications to pathology residencies by Jazan University medical graduates, it may be necessary to understand the factors and influences that may favorably or unfavorably affect the choice of pathology as a profession. Thus, the need for this study is to address the factors affecting medical students' choice of pathology as a specialty here in the Southern region of Saudi Arabia, which will contribute ultimately in addressing the issue of shortages in pathologists in Saudi Arabia. The gap in the teaching of pathology at the Faculty of Medicine, Jazan University which is limited to the 2nd and 3rd year could negatively influence the willingness of the graduates to apply for pathology clerkship programs. Hence, this study aims to investigate the perception of undergraduate medical students at Jazan University towards choosing pathology as a future career choice and the factors influencing their decisions. The findings can help determine the future direction of the curriculum at our institution.

## Materials and Methods

### Study Design, Setting and Participants

A cross-sectional study design was adopted to recruit the study participants. The study was conducted among undergraduate medical student, Jazan University in Jazan-Saudi Arabia. Jazan University is a leading institution of higher education in the region with 26 faculties enrolling more than 50,000 students. Jazan region is one of the thirteen regions of the Kingdom of Saudi Arabia. It is located on the tropical Red Sea coast in southwestern Saudi Arabia. Jazan covers an area of 11,671 square kilometers, including some 5000 villages and towns. Attached to it are 100 islands, including the largest island of Farasan. Jazan region runs along the Red Sea coast for almost 200 miles (300 km). It is a highly populated state with a total population of 1.5 million. The research targeted Undergraduate medical student includes male

and female at faculty of medicine, Jazan University from 2nd to 6th year. The main Inclusion criteria is being undergraduate medical student at medical college of Jazan University from 2nd (the survey was distributed after taking pathology module) to 6th year who registered as a formal student in the academic year 2021/2022. We excluded students at the first year as they still doing their basic science requirement.

## Sampling Procedure

The sample size for this study was calculated to be 421 students using sample size formula for cross-sectional study design. We used  $n = [z^2 p (1 - p)] / d^2$ , where:  $n$  = sample size  $P$  = the required proportion or attribute under consideration, 95% confidence interval and  $d$  the error. Using  $p = 50\%$  as no prior knowledge about students' perception or knowledge, the error not more than 5% (1.96 to a confidence level of 95%). This equation provides initial sample size of 383 and after accounting for non-response rate because we are using web-based survey which is characterized by high nonresponse rate we increased the sample size with a 10% non-response rate then the final sample size was 421 undergraduate students. For implementing the sample size plan, we used stratified sample technique to select students for the different an academic level.

## Method of Data Collection, Study Tool and Variables

Data was collected using (web-based) a self-administered questionnaire because of COVID-19 pandemic. The study questionnaire contains 20 questions and based on similar studies conducted previously.<sup>9-14</sup> The face validity of the instrument was assessed, and the instrument was reviewed by two pathologists. The developed questionnaire based on three major components. Firstly, sociodemographic data. Secondary, pathology choosing as a future career choice. Finally, estimates the level of knowledge about digital pathology among participants. Study outcomes were career choice of pathology, the knowledge about the digital pathology and the attitudes towards pathology as future career. The set of independent variables include demographic variables such as age, gender, social status, educational year, GPA. Using 20 questionnaires a pilot study was carried out to assess the tool's reliability the Cronbach's alpha statistics revealed that 0.782.

## Data Entry and Statistical Analysis

The data collected was analyzed using the statistical package for the social sciences (SPSS) software SPSS Ver 20. Descriptive statistics was calculated for study variables (eg, frequency and percentage for qualitative variables and mean and standard deviation for quantitative variables). The Chi square test was used for evaluating some associations. The logistic regression model was also used and the corresponding ORs with their 95% CIs were also estimated for the independent predictors of the desire to choose Pathology as a future speciality. A  $p$ -value less than 0.05 was used to indicate statistical significance.

## Ethics

Consent was prepared and given to all students participating in this study. It was made clear for the students that their decision to accept or decline participation in this study is completely voluntary and there is no link with their performance at the university. Ethical approval was obtained from the Jazan Research Ethics Committee with the reference number REC-43/02/003. All information was kept confidential and was not accessed except for scientific research purposes.

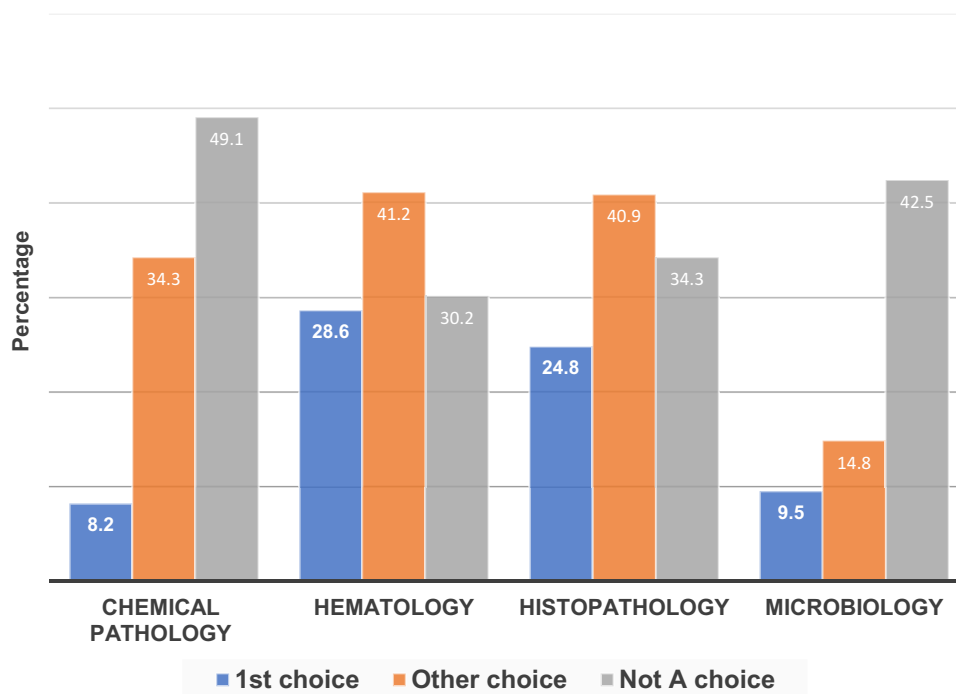
## Results

The response rate in this study was 92.9% (391 out of 421). Table 1 provides background characteristics and the desire to choose Pathology as a future career for the study participants. Out of the total, 50.6% (198) were males. Students in the 2nd year wish to work in pathology as a future profession more than others (37.8%). A large proportion of undergraduates with CGPA between 3 and 3.5 (44.4%) preferred pathology as a future choice. The desire to choose Pathology as a future career differs significantly according to age groups, academic level, GPA, and mothers' educational level ( $P < 0.05$  for all).

**Table I** General Characteristics of the Medical Students That Participated in the Research and the Desire to Choose Pathology as a Future Career (N = 391)

Characteristic		All Participants		Having a Desire to Choose Pathology as a Future Career		p value
		N	%	N	%	
Gender	Male	198	(50.6)	47	(23.7)	0.619
	Female	193	(49.4)	50	(25.9)	
Age Groups	Less than 21 years	103	(26.3)	36	(35.0)	0.020
	21–23 years	208	(53.2)	45	(21.6)	
	24 years and more	80	(20.5)	16	(20.0)	
Social Status	Single	371	(94.9)	93	(25.1)	0.906
	Married	20	(5.1)	4	(20.0)	
Academic Level	2nd	74	(18.9)	28	(37.8)	0.002
	3rd	79	(20.2)	26	(32.9)	
	4th	75	(19.2)	14	(18.7)	
	5th	87	(22.3)	19	(21.8)	
	6th	76	(19.4)	10	(13.2)	
Cumulative Grade Points Average (CGPA)	4.5–5.0	156	(39.9)	44	(28.2)	0.013
	4.0–4.49	91	(23.3)	16	(17.6)	
	3.5–3.99	84	(21.5)	17	(20.2)	
	3.0–3.49	36	(9.2)	16	(44.4)	
	2.0–2.29	24	(6.1)	4	(16.7)	
Father level of Education	Less than high school	62	(15.9)	8	(12.9)	0.096
	High school	67	(17.1)	17	(25.4)	
	University Degree	230	(58.8)	65	(28.3)	
	Postgraduate level	32	(8.2)	7	(21.9)	
Mother's level of Education	Less than high school	118	(30.2)	21	(17.8)	0.043
	High school	62	(15.9)	23	(37.1)	
	University Degree	195	(49.9)	49	(25.1)	
	Postgraduate level	16	(4.1)	4	(25.0)	
Medical Doctor in the family	Yes	156	(39.9)	33	(21.2)	0.173
	No	235	(60.1)	64	(27.2)	
Total		391	(100)	97	(24.8)	

Figure 1 demonstrates the preferred sub-speciality of pathology by the participants. Among the undergraduates who planned to pursue a pathology specialty after graduation, 28.6%, 24.8%, 9.5%, and 8.2% would like to specialize in hematopathology, histopathology, medical microbiology and chemical pathology, respectively. The majority of respondents preferred either not to choose or preferred another choice of specialty other than pathology.



**Figure 1** Sub-specialty of pathology preferred by medical students.

Table 2 presents medical students' perceptions regarding Pathology and Digital Pathology according to gender. The Table indicated that respondents' views on awareness of the indications of intra-operative consultation were significantly different according to gender ( $P < 0.05$ ). Reasons for not choosing Pathology as a future career ranged from having

**Table 2** Medical Students Perception Regarding Pathology and Digital Pathology According to Gender (N = 391)

Statement		All Participants		Gender				p value
				Male		Female		
		N	%	N	%	N	%	
Aware of the indications of intra-operative consultation	Yes	282	(72.1)	129	(65.2)	153	(79.3)	0.002
	No	109	(27.9)	69	(34.8)	40	(20.7)	
Relevant clinical history and differential diagnoses is crucial to the pathologist	Yes	348	(89.0)	172	(86.9)	176	(91.2)	0.172
	No	43	(11.0)	26	(13.1)	17	(8.8)	
Know the exact role of pathologist in patient care	Yes	98	(25.1)	56	(28.3)	42	(21.8)	0.137
	No	293	(74.9)	142	(71.7)	151	(78.2)	
Are you aware of/ read about digital pathology	Yes	70	(17.9)	41	(20.7)	29	(15.0)	0.143
	No	321	(82.1)	157	(79.3)	164	(85.0)	
Do you see a need for digital pathology in your practice	Yes	243	(62.1)	115	(58.1)	128	(66.3)	0.093
	No	148	(37.9)	83	(41.9)	65	(33.7)	
Digital pathology is safe and reliable for daily practice compared to microscopic examination	Yes	290	(74.2)	152	(76.8)	138	(71.5)	0.234
	No	101	(25.8)	46	(23.2)	55	(28.5)	

a negative impression considering pathology (5%) or were not sure to consider it or not (15%), followed by a preference for direct patient contact (16%) to almost half of respondents who favoured another speciality (47%) (Figure 2).

Figure 3 illustrates medical students' attitudes towards pathology as a future career. Almost 46.7% agree or strongly agree that pathologists cannot interact with patients, while 41.7% also agree or strongly agree that pathology is a complicated subject. Only 18.6% agree or strongly agree that pathologists enjoy high salaries.

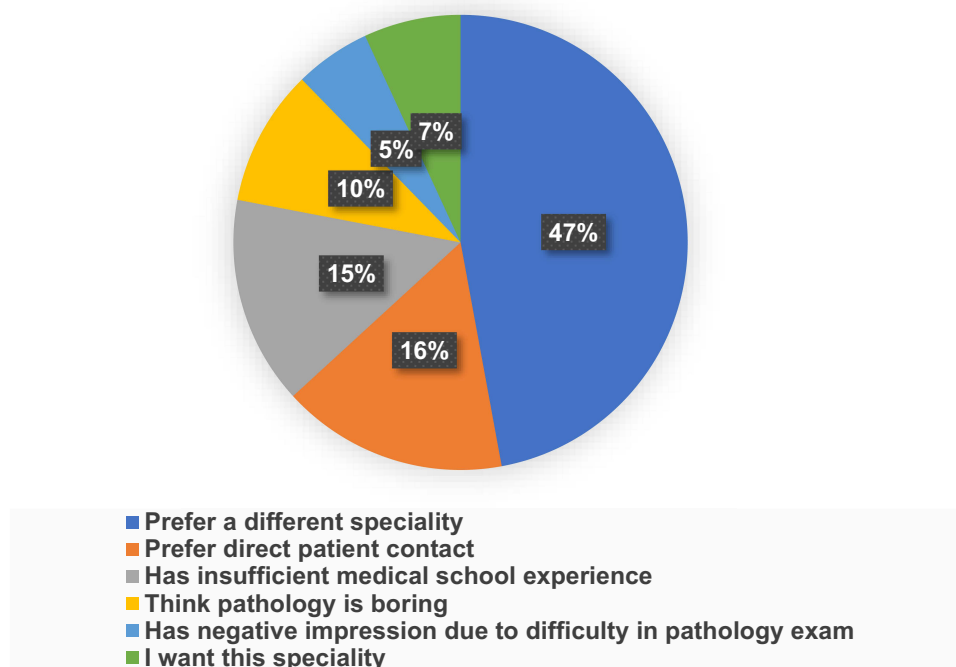


Figure 2 Reasons for not choosing pathology as future career.

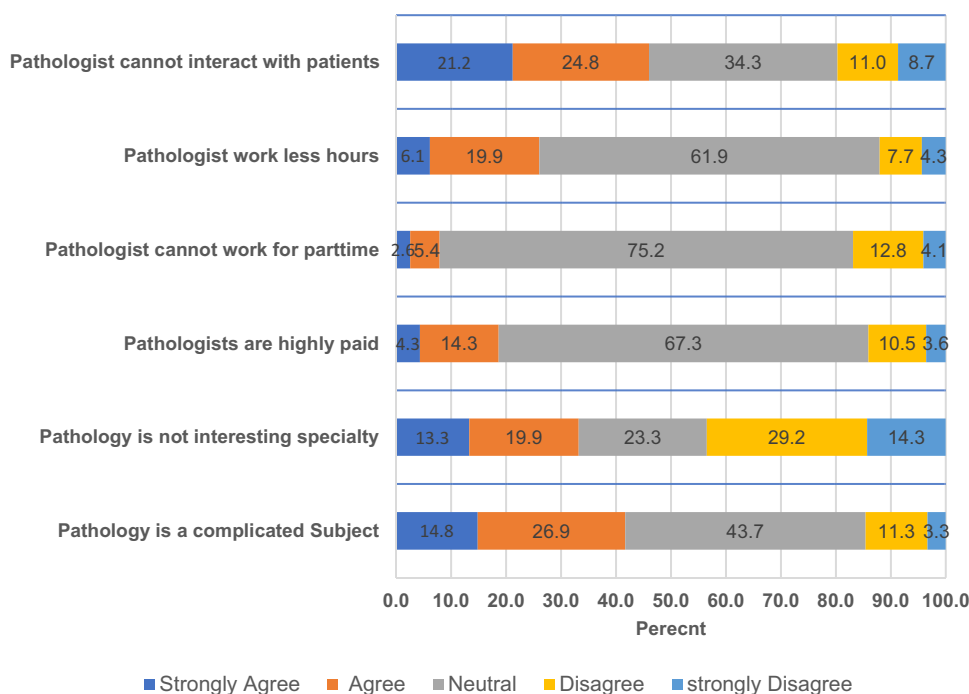


Figure 3 Medical students' attitudes towards pathology as a future career.

**Table 3** Reasons for Choosing the Future Specialty

Statement		All Students		Gender				P value
				Male		Female		
		N	%	N	%	N	%	
My friends and family members opted this specialty	Yes	49	(12.5)	26	(13.1)	23	(11.9)	0.717
	No	342	(87.5)	172	(86.9)	170	(88.1)	
Great opportunity for scientific research in this specialty	Yes	203	(51.9)	100	(50.5)	103	(53.4)	0.571
	No	188	(48.1)	98	(49.5)	90	(46.6)	
Community needs more experts in this specialty	Yes	251	(64.2)	127	(64.1)	124	(64.2)	0.982
	No	140	(35.8)	71	(35.9)	69	(35.8)	
This matches with my capabilities	Yes	290	(74.2)	145	(73.2)	145	(75.1)	0.668
	No	101	(25.8)	53	(26.8)	48	(24.9)	
Having a patient in my family	Yes	93	(23.8)	50	(25.3)	43	(22.3)	0.490
	No	298	(76.2)	148	(74.7)	150	(77.7)	
Can dedicate more time to myself and my family	Yes	195	(49.9)	96	(48.5)	99	(51.3)	0.578
	No	196	(50.1)	102	(51.5)	94	(48.7)	
High chances of getting jobs in this field abroad	Yes	269	(68.8)	143	(72.2)	126	(65.3)	0.139
	No	122	(31.2)	55	(27.8)	67	(34.7)	

Regarding the reasons for choosing the medical profession, it was observed that there is a great opportunity for scientific research in this specialty, the community needs more experts in this specialty, which matches with my capabilities, and high chances of getting jobs in this field abroad were the most typical causes of choosing the future specialty among the participants (Table 3).

Table 4 shows the logistic regression analysis for the independent predictors of the desire to choose Pathology as a future specialty. The analysis showed that the age group (21–23) years old are a statistically strong predictor of the desire to choose Pathology as a future specialty (OR = 0.465, 95% C.I: (0.24–0.92)  $p = 0.028$ ). Pathology is not

**Table 4** Logistic Regression Analysis of Independent Predictors of the Desire to Choose Pathology as a Future Specialty

Variables	p value	OR	95% C.I. for (OR)	
			Lower	Upper
Gender				
Female (ref)				
Male	0.620	0.89	0.56	1.41
Age groups(years)				
Less than 21 years (Ref)				
21–23 years	0.028	0.465	0.24	0.92

(Continued)

**Table 4** (Continued).

Variables	p value	OR	95% C.I. for (OR)	
			Lower	Upper
24 years and more	0.761	0.906	0.48	1.72
Academic year				
2nd (Ref)				
3rd	0.524	0.81	0.41	1.57
4th	0.010	0.38	0.18	0.80
5th	0.028	0.46	0.23	0.92
6th	0.001	0.25	0.11	0.56
Reasons for choosing				
Pathology is not interesting Subject	0.001	0.32	0.16	0.64
Pathologists are highly paid	0.151	2.71	0.70	10.53
Pathologists do not interact with the patients	0.009	0.36	0.17	0.77
The study of pathology is very complex	0.325	0.56	0.17	1.79

**Abbreviations:** OR, estimated ODDs ratio; 95% C.I., a 95% confidence interval; ref, reference category.

interesting Subject argument significantly reduced the desire to select pathology as a future career by 68% [OR = 0.32, 95% CI: (0.16-0.24),  $p = 0.001$ ]. Pathologists do not interact with the patients also significantly affected the desire to choose pathology by 64% [OR = 0.36, 95% CI: (0.17-0.77),  $p = 0.009$ ].

## Discussion

Choosing a specialization that would last as a career life is one of the most crucial decisions any medical student makes after graduation. In this study, we investigated medical students' willingness to pursue pathology as a career in the future and the factors influencing those intentions. We found that participants preferred general surgery followed by internal medicine specialties. Our results are consistent with studies carried out in Botswana,<sup>15</sup> Syrian<sup>16</sup>, Sudan,<sup>3</sup> Bahrain,<sup>17</sup> UAE,<sup>18</sup> and KSA.<sup>11</sup> Among the respondents involved in this study were shown that 16.2% interested in pathology; only 3.1% choose the field as their first future career choice.

Existing studies assessing the desire of undergraduate medical students towards pursuing pathology as a life career in Saudi Arabia provide a variable finding. A multi-institution investigation found just 5% of undergraduates declare pathology as their first choice in the future.<sup>12</sup> An online investigation provided that the percentage of undergraduate medical students who chose pathology as their first choice for a future residency program was only 0.7, even though 8.7% of them thought about it.<sup>10</sup>

Comparing the findings of our investigation to similar international studies yielded several similarities. The determinants influencing specialization choice were examined using a nationwide survey of fourth-year US allopathic medical students. Around 27% of the respondents considered pathology as a potential career.<sup>19</sup> A Canadian study discovered that about 9% of senior medical students in focus group discussions were actually interested in pathology.<sup>5</sup> Another Canadian investigation revealed that 7.6% of clinical residents who responded to the survey had thought about going to the pathology program before deciding on other career paths.<sup>6</sup> In a Nigerian survey, it was shown that 76.5% of participants showed interest in pathology; 18.8% chose the field as their first career choice post-graduation, followed by 5.9%, 3.5%, and 5.9% as their second, third, and tenth choices, respectively. Within the field of pathology, 8.2%, 4.7%, 3.5%, and 2.4% of respondents would like to specialize in histopathology, hematology, chemical pathology, and medical microbiology, respectively.<sup>13</sup>



The strongest aspect of this investigation is how it clarified the factors that can impact medical students' decisions to choose pathology as a career in the future. The findings will help make future planning suggestions for Jazan University's undergraduate medical students to increase pathology clerkship matching. Pathology is a less well-known specialty for undergraduate medical students. Because of the lack of guidance towards pathology specialty, there is a suggestion for creating a website to explore the pathology field and make it more familiar from students' perspectives and throughout residency life. This could increase the number of applicants for pathology residency training programs. Integrating a pathology rotation to the surgery clinical rotation to enhance pathology exposure for undergraduate students this will provide a clear image of the everyday workflow and significance of pathology to the provision of health services.<sup>20</sup> Instead of solely asking for the primary specialization selection, we asked for the top three options to better represent the preferences of the undergraduate. The results, however, cannot be generalized to other Saudi Arabian Universities. The study's small sample size could impact the precision of the findings which is a limitation of this study.

## Conclusion

In conclusion, it is very important for all medical students to select their future jobs depending on their own desire. The selection should not depend on the medical students' parents' desire and moreover the graduated students should not join what is just available in front of them of specialty at a certain time of their future life. It is well known that the output and the success of any person in a certain job correlate closely and directly to the degree of desire in his or her job. We aimed mainly in this limited research to discover as early as possible those medical students who really look for pathology as their first or second choice concerning their future career and then to help them keeping this own desire strong till they become members of that type of pathologists who like their job and who make a big difference in their community.

Through our research, we found an obvious regression in the students desire to choose pathology as a future career. About 37.8% of students within the third year showed a desire to pathology spatiality concerning their future career. That percentage regressed markedly for the sixth year students to become only 13.2%. We suggest an initiation of a medical students association for those who show an early real desire in pathology as a selected future career. The students in this association are expected to get closer to their teacher pathologists and to share them part of their daily duties, scientific discussions, researches, workshops, seminars...etc.

Firstly, we recommend to repeat this research locally after the initiation of the students association within a period of time not more than five years. Secondly, we recommend similar, but wider study that include medical students in other faculties of medicine within the kingdom of Saudi Arabia, especially if we succeed in expanding the experience of university students' scientific associations, and to translate it into reality among them. Furthermore, similar future studies can be expanded more to include university students of other specialties, other faculties, and even other Saudi universities. Future jobs that based on own desires for all Saudi universities' students will be a considered, real, nice change in Saudi society and in KSA development.

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## Disclosure

The authors report no conflicts of interest in this work.

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