

# Awareness and knowledge of familial Mediterranean fever among medical scope students in Syrian universities: A cross-sectional study

SAGE Open Medicine

Volume 11: 1–6

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DOI: 10.1177/20503121231155996

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## Abstract

**Introduction:** Familial Mediterranean fever is an autoinflammatory autosomal recessive disorder common among individuals of Mediterranean descent. It is characterized by recurrent episodes of fever accompanied by peritonitis, pleurisy, pericarditis, and/or arthritis, sometimes accompanied by an erysipelas-like rash. Mimicking manifestation of other inflammatory conditions and the diversity of symptoms leads to insufficient knowledge and understanding. General knowledge about this disease is considered low in most populations, but this bears greater consequences in people with high incidence rates. This study investigates the knowledge of familial Mediterranean fever among a group of medical students in public and private Syrian universities.

**Methods:** A cross-sectional study was conducted in May 2022, and an international standard-based electronic questionnaire was adopted. The study included 758 current undergraduate medical scope students from public and private universities in Syria. The survey used for this study included inquiries made to assess awareness using global standards. It was divided into 2 sections, with 7 questions focusing on sociodemographic characteristics and 17 questions assessing the students' understanding of Familial Mediterranean fever.

**Results:** Our analysis showed strong correlations between the knowledge of Familial Mediterranean fever and certain specialization, college, academic year, and marital status. The mean score of answers was 9.39 out of 17 for all participants. The mean score of answers for medical students was 10.01 out of 17, while it was 8.81 for pharmaceutical students and 6.51 for dental students. These differences were statistically significant,  $p$ -value  $<0.001$ . This means medical students know better than pharmaceutical students, who already have better knowledge than dental students.

**Conclusion:** We conclude that medical scope students' knowledge about the disease of Familial Mediterranean fever and its management is ineffective, especially among dental students, even in a country with high prevalence rates for Familial Mediterranean fever like Syria.

## Keywords

FMF, medical education, Syria

Date received: 31 October 2022; accepted: 23 January 2023

## Introduction

Familial Mediterranean fever (FMF) is the most common hereditary periodic fever syndrome. The responsible gene for this autosomal recessive genetic disorder is the *MEFV* gene.<sup>1</sup> It is most common in populations in the Mediterranean region or of Mediterranean origin. Populations at high risk include Arabs, Turkish, Armenian, and Jews.<sup>2</sup> The prevalence of FMF varies among countries but is highest in the

previously mentioned populations, with a rate of 1 in 200 to 1000 people. Previous studies suggest that over 100,000

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people suffer from the disease in the world nowadays.<sup>3</sup> Although the genetic aspect of FMF is clear, genetic testing was not considered necessary for the diagnosis of FMF because it is expensive and unavailable. Diagnosis is based on clinical manifestations of self-limiting, recurrent fever, often accompanied by symptoms such as arthritis and severe abdominal pain.<sup>4,5</sup> It is essential to start a lifelong daily treatment with colchicine, which has two aims: to reduce the attacks frequency and restrain the formation and progression of amyloidosis.<sup>6,7</sup>

Amyloidosis is considered the most serious complication of this condition, in which amyloid builds up and accumulates in multiple tissues causing organ damage. This often starts in the kidney with nephrotic syndrome and progresses into renal failures.<sup>8</sup> General knowledge about this disease is considered low in most populations, but this bears greater consequences in populations with high incidence rates. Insufficient knowledge and understanding of this disease are driven by the mimicking manifestation of other inflammatory conditions and the diversity of symptoms, which varies from one individual to another and within the same family.<sup>9,10</sup>

This imposes delayed or missed diagnosis, unbeneficial treatment risks, and progression of serious complications.

In this study, we aim to assess the knowledge and awareness of FMF among medical and health science students in private and public universities in Syria, who are considered the first line in spreading medical awareness and contacting affected patients. The importance of this study is also reflected in the significant lack of research on this topic and the spread of the disease in the Middle East, as it is the first study of its kind in Syria, after reviewing the medical literature.

## Methods

### Study design

A cross-sectional study pertaining to the knowledge and awareness of FMF among medical and health science students. The study was conducted in May 2022.

### Participants

A convenience sampling method was used. All participants were current undergraduate medical and health science students from public and private universities in Syria. Participants were enrolled from different medical fields: medicine, dentistry, and pharmacy. All forms with missing data and those answered by graduate students have been filtered out.

### Data collection

An anonymous online questionnaire was designed using Google Forms and was distributed to medical students via online platforms.

Participation was available for all students from the second through the last year. The survey lasted for 15 days (2nd to 17th of May). The study's aims were explained to the participants, who were informed that their participation was voluntary, and anonymity was guaranteed. The participants were also made aware that the results of this research would be published.

The study was approved by the Ethical Committee of the Faculty of Medicine at Aleppo University with serial number (1467/3654) and complied with the principles of the Helsinki Declaration.

### Questionnaire

The questionnaire adopted for this study contained questions designed to use international standards to assess awareness.

A self-administered validated Arabic-language questionnaire was used in this study.

It was composed of two sections: sociodemographic characteristics (gender, university, year of study, employment status, and marital status) and a set of assessment questions for students' knowledge of FMF (its symptoms, way of transmission, treatment options, and possible complications).

The first section included 7 required questions and 1 optional question (for the graduate major), and the second section had 17 questions.

In addition to two other questions, where the first was about any first-degree relatives of the participants diagnosed with FMF, including themselves, and the second one was for participants' enrollment approval.

The assessment questions were adopted and validated from previous studies<sup>11</sup>; each question had 1 mark, making the final mark 17.

The 17-item questionnaire included 16 questions with "yes, no, I don't know" answer scale. The score ranges from 0 to 17. Scores less than 5 are considered "weak," 6–11 are "moderate," and 12–17 are "excellent."

### Statistical analysis

The data were automatically exported from Google forms to Excel, and analysis was performed using Statistical Package for Social Sciences software package (SPSS Inc., Chicago, IL, USA) version 23. One-way analysis of variance was performed to assess the overall differences in mean knowledge scores. The Independent *t*-test was used to define the association of variables with the extent of understanding regarding FMF.

### Sample Size

The sample size (*n*) was determined by Cochran's sample size formula with the assumption of 95% confidence level ( $Z=1.96$ ), *e* is the margin of error which is 5%, *p* is the

(estimated) proportion of the population which has the attribute in question, and it equals 50% (or 0.5), and  $q$  is  $1-p$

$$n = \frac{Z^2 pq}{e^2}$$

The required sample size ( $n$ ) for this study, applying the previous formula, is 374.

## Results

A total number of 797 online surveys were collected. After excluding all participants who were not medical students (medical field), the final participants' number was 758.

90.8% of participants were from Syrian public medical colleges and 9.2% from Syrian private medical colleges. Among those, 72.4% were studying medicine, 15.2% and 12.4% were studying pharmacy and dentistry, respectively. Female participants counted for 65.7% of the sample versus 34.3% for males. Other sample details and characteristics are shown in Table 1.

The mean of test results was 9.39 out of 17 for all participants. The mean of test result for medical students was 10.01 out of 17, while it was 8.81 for pharmaceutical students, and 6.51 for dental students. These differences were statistically significant,  $p$ -value  $< 0.001$ . Which means medical students know better than pharmaceutical students who already have better knowledge than dental students.

The type of university had a significant impact on the FMF knowledge test,  $t(756) = 3.35$ ,  $p$ -value = 0.001. Public universities' students (mean = 9.56) had a higher test result than private universities' students (mean = 7.77). Furthermore, there was a significant relationship between marital status and FMF knowledge,  $t(756) = -3.38$ ,  $p$ -value = 0.001, married students (mean = 11.93) had more knowledge about FMF than single students (mean = 9.29). Neither gender nor work, or financial status had a significant impact on the FMF knowledge, with a  $p$ -value of 0.081, 0.107, and 0.453, respectively.

Additionally, there was a significant relationship between the year of study and the knowledge of FMF,  $p$ -value  $< 0.001$ . The greater the year is the more the knowledge reported. 36.93% of students had a good knowledge of FMF (their test results were from 12 to 17), whereas 44.98% had an average knowledge (their test results were from 6 to 11), finally, 18.07% had a low knowledge of FMF (their test results were from 0 to 5) (Figure 1).

The students who had a good knowledge of the FMF were 36.93% ( $n = 280$  student), out of which, 85.71% ( $n = 240$ ) were medical students, 10% ( $n = 28$ ) were pharmaceutical students, and 4.28% ( $n = 12$ ) were dental students. Whereas the students who reported an average knowledge of the FMF were 44.98% ( $n = 341$ ), out of which 66.56% ( $n = 227$ ) were medical students, 19.35% ( $n = 66$ ) were pharmaceutical students, and 14.07% were dental students. Finally, those who reported low knowledge of the FMF counted for 18.07% ( $n = 37$  student), out of which 59.85% ( $n = 82$ ) of them were

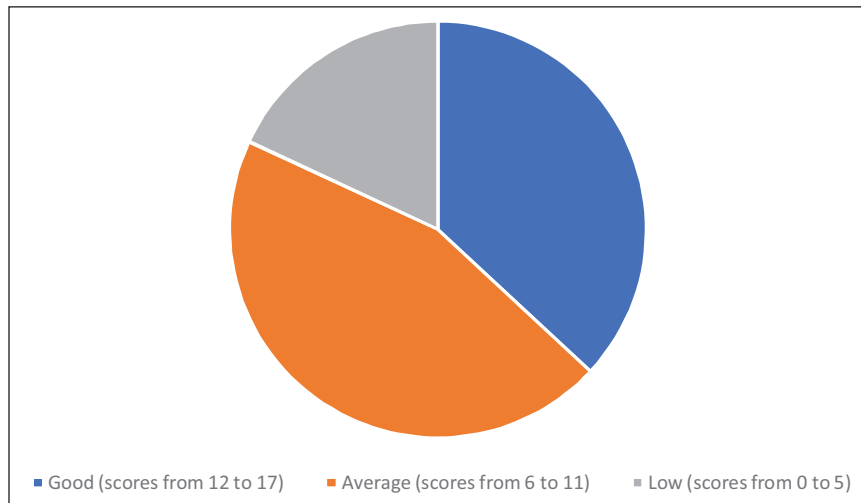
**Table 1.** Demographic characteristics of medical scope students.

Variables	Frequency (n)	Percent
Gender		
Male	260	34.3
Female	498	65.7
Academic year by 2020/2021		
Second year	134	17.7
Third year	94	12.4
Fourth year	262	34.6
Fifth year	148	19.5
Sixth year	120	15.8
Specialization		
Medicine	549	72.4
Pharmacy	115	15.2
Dentistry	94	12.4
University (sector)		
Damascus University (public)	417	55.0
Aleppo University (public)	131	17.3
Al-Baath University (public)	46	6.1
Tishreen University (public)	45	5.9
Hama University (public)	22	2.9
Tartous University (public)	28	3.7
Arab International University (private)	5	0.7
University of Kalamoon (private)	5	0.7
Syrian Private University (private)	13	1.7
Al-Andalus University (private)	10	1.3
Al-Hawash Private University (private)	5	0.7
Ebla Private University (private)	1	0.1
Islamic University of Science and Technology (private)	11	1.5
Al-Sham Private University (Private)	15	2.0
Qasyoun University (private)	3	0.4
Al-Jazeera University (private)	1	0.1
Financial status		
Good	251	33.1
Average	420	55.4
Bad	34	4.5
I would rather not say	53	7.0
Marital status		
Single	727	95.9
Married	31	4.1
Work status		
Yes	152	20.1
No	606	79.9

medical students, 15.32% ( $n = 21$ ) were pharmaceutical students, and 24.81% ( $n = 34$ ) were dental students.

## Discussion

Seven hundred and fifty-eight (excluding all participants who were not medical field students) students participated in the study, and as shown in Table 1, we noted that the



**Figure 1.** The knowledge of FMF levels distribution.

fourth- and fifth-year students were the most responsive to the survey; we suspect that the reason behind is the positive attitude and increased concerns toward research among clinical years students and the encouragement of professors in Syrian medical universities. A study about attitudes, barriers, and practices toward research and publication among medical students at the University of Damascus, Syria has observed that students in their clinical years of study show more appreciation for the importance of research during medical school than basic years students.<sup>12</sup> Moreover, it has been shown that the second-year students, despite their lack of knowledge in research and FMF disease, participated in more numbers than the third-year students; we consider their participation refers to their positive attitude toward research as well. This status has been reported in a previous study conducted in India among medical students which observed the same finding that the second-year students have a positive attitude toward research more than third-year students.<sup>13</sup> Moreover, this concept was supported by another study about attitudes, practices, and perceived barriers toward research in undergraduate medical students of six Arab countries, which has observed that being a student in the basic years is associated with more positive attitudes toward research and yet higher anxiety toward its practice.<sup>14</sup>

We find a correlation between the level of education and knowledge about the disease. When comparing our results to other studies' results, a previous study found that caregivers of patients with FMF have greater knowledge about the disease than those who provide care for other diseases, despite the fact that most of the caregivers of FMF patients have an educational status of secondary school or less, as the study found that being close to a patient provides a higher level of awareness about FMF regardless of one's level of education.<sup>11</sup>

Nevertheless, another study conducted in Turkey among parents of FMF children found a positive correlation between

educational status and the knowledge level of FMF among parents of those children.<sup>15</sup>

As it has been mentioned, the study reported variations in the knowledge score among involved medical field students; 36.1% of dental students had low knowledge of the FMF, while 14.93% of medical students and 18.2% of pharmaceutical students had low knowledge of the FMF.

A previous study about knowledge of Alzheimer's disease conducted among medical, dental, and pharmacy students also confirmed that medical and pharmaceutical students cover a wide range of topics related to Alzheimer's more than dental students.<sup>16</sup>

We believe that the difference in mean knowledge scores between medical students and the other streams might be due to more in-depth discussion on inherited diseases with medical students during lectures and clinical exposures compared to others. This has been reported in a previous study conducted in Malaysia about knowledge of Hepatitis B among medical, dental, and pharmacy students, which observed the same finding.<sup>17</sup>

Furthermore, pharmaceutical students cover a wide range of topics related to diseases too, thus we detect that there is a gap in dental students' knowledge of diseases (in our study FMF disease, other studies Alzheimer's and Hepatitis B) that might be due to the fact that they focus more on clinical practice during their dental school years. Even though dental students have low knowledge of the FMF, a study conducted in Turkey showed that dental caries and periodontal diseases, which are public health problems, were seen in a high percentage of children with FMF.<sup>18</sup>

This leads us to an essential point, raising awareness among medical field students and especially dental students is needed.

The knowledge of FMF was higher among married students, and we found a highly significant correlation between marital status and FMF knowledge. This could be

primarily explained by two major factors that influence married couples' understanding of hereditary illnesses (since FMF is an inherited disease). On the other hand, FMF does not cause a serious illness that requires screening. Therefore, it is not anticipated that the marriage applicants will be aware of this issue. Nonetheless, the fact that the married students are aware of one another would suggest that they are concerned that FMF will have an effect on their relationship.

A study conducted in North Carolina, United States among individuals (65% have a college degree), showed a relationship between increased genetic knowledge and participants with higher education levels.<sup>19,20</sup>

The factor is conducting premarital screening tests; as we believe that they influence the knowledge of married couples about common genetic diseases, especially that undergoing premarital screening tests is mandatory in Syria. However, the effect of this factor will be indirect in our research since FMF disease test is not included in a premarital screening test because it is expensive.<sup>20</sup>

With the meeting of the factor, "they took premarital screening tests before marriage that did not include the FMF disease test," they will be more aware of the symptoms, signs, diagnosis, and treatment methods of the disease; due to their fear of being a carrier of the disease, and thus the possibility of transmitting the disease to their children. Consequently, we find that their inability to take the FMF disease test positively increases their awareness of FMF disease.

As mentioned earlier, we did not find any significant relationship between FMF knowledge and gender, or financial status as well, yet we noticed that the type of university had a significant impact on this knowledge. Students at public universities in Syria scored higher than students at private universities. In Syria, public universities are totally free, so the students attending these universities must get high marks in high school (approximately 96% to attend the preparatory year for medical colleges, which is the first year of medical field studies), in contrary private universities are paid, and they do not require high marks in high school to be attended, students do not have to attend the preparatory year, so they directly attend the college they want. As a result of this, we think that most public universities students are better than most private universities students according to their marks in high school.

Another influencing factor is that public universities have access to university teaching hospitals so that the students in their clinical years have more exposure to typical cases and the patients have a more positive attitude toward medical students. A previous study conducted in Syria in Damascus University teaching hospitals among patients, concluded that there is an overall positive attitude to the medical students' involvement in medical education.<sup>21</sup>

Unlike private universities' students whose clinical training in clinical years is limited to some public hospitals in the city.

Additionally, there was a significant relationship between the year of the study and the knowledge of FMF. This finding is predicted because students in their last year have studied this disease in several courses over the 5 years, and naturally, their knowledge of diseases and their symptoms, diagnosis, and treatments have increased. A previous study conducted in Serbia among two medical generations, younger students and older students (second year of medical study and last year of medical study) about CVD showed the same finding.<sup>22</sup>

## Limitations

*Geographical location:* The study was conducted in Syria, which may have a higher prevalence of FMF compared to other countries. This means that the findings may not be generalizable to other populations.

There may be other factors that affect the students' knowledge of FMF that were not considered in the study, such as access to information or educational resources. These factors could have an impact on the findings.

*Limited follow-up:* The study was conducted using a cross-sectional design, which means that the data were collected at a single point in time. This means that the study was not able to assess any changes in the students' knowledge over time or evaluate the effectiveness of any interventions that may have been implemented.

## Conclusion

In conclusion, medical students' knowledge about the disease of FMF and its management is ineffective, especially among dental students, and they need further development through many methods of learning at the university and on social media platforms. Health education programs are also necessary for our country to raise knowledge about this disease in general.

## Author contributions

All authors have participated in writing the article, collecting data, and reviewing the literature. JS analyzed the data statistically and created tables. YH critically and linguistically revised the article. JA contributed to the revision and preparation of the article. YH and JA conceived and supervised the conduct of the study. All authors read and approved the final article.

## Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available because they are in Arabic. Some restrictions apply to the availability of these data but are available from the corresponding author on reasonable request.

## Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.



## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

## Informed consent

Written informed consent was obtained from all subjects before the study.

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## Supplemental material

Supplemental material for this article is available online.

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