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# Muslims perceptions of safe alcohol use: a qualitative study in the Gulf Council Cooperation countries

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## Abstract

**Aim** The purpose of this study was to explore Muslim's perceptions and views of raising awareness on safe alcohol use and counterfeit alcohol harms in Islamic countries.

**Subject and methods** Qualitative semi-structured interviews with a purposive sample from the Gulf Council Cooperation (GCC) countries. The data were analysed using a reflexive thematic analysis method.

**Results** Twenty-three participants took part in this study. We have identified five themes from the data, including perceptions on alcohol use in the GCC, community's openness to alcohol discussions, approaches to raising awareness on alcohol use, all forbidden is desirable, and legalisation is the solution. All participants acknowledged the existence of alcohol use in GCC communities and advocated for the need to raise public awareness about the harms of alcohol use. Opinions on approaches to raising awareness varied. Some participants suggested focusing awareness on the religious messages prohibiting alcohol use, emphasising that alcohol is harmful in any quantity. For some, raising awareness of safe alcohol consumption was viewed as accepting and encouraging alcohol use, which goes against Islamic religious beliefs. Some participants attributed alcohol misuse and the consumption of counterfeit alcohol to the ban on alcohol products in some GCC countries.

**Conclusions** Muslims acknowledge the existence of alcohol use in Muslim communities, yet there is a hesitancy in raising awareness of safe alcohol use. Although challenging, there is a need to combine the public health perspective on safe alcohol use while providing messages that acknowledge the religious aspect.

**Keywords** Qualitative study, Muslim communities, Religion, Alcohol use, Counterfeit alcohol

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## Introduction

Alcohol abuse is associated with three million deaths and over 132 million disability-adjusted life years globally [1]. Although effective interventions to reduce unsafe alcohol consumption exist, comprehensive national alcohol harm reduction policies are still lacking in many countries [1].

Alcohol use is forbidden in many religions, including Judaism and Islam. Alcohol use in Muslim communities is below the global average, yet reports show that unrecorded consumption is high [1]. In recent years, there has been increasing attention on alcohol-related harms in Muslim communities [2]. However, since alcohol consumption is prohibited in Islam, several challenges are facing Muslim-majority countries where alcohol-related policies are severely lacking [3].

The religious and cultural sensitivity toward alcohol acts as a barrier to the development of policies and interventions to tackle alcohol misuse. The sensitivity also means that alcohol-related discussions are challenging even in clinical settings. Evidence suggests that health-care professionals stigmatise patients with alcohol misuse problems. The stigma and discrimination were more pronounced towards women who drink alcohol [4]. Muslim patients were also found to be less likely to report personal alcohol use than individuals from other religions [5].

Gulf Council Cooperation (GCC) countries have varying policies and regulations about alcohol sales and consumption. Alcohol consumption is legal in most GCC countries [3]. In Saudi Arabia and Kuwait, alcohol distribution and consumption are illegal, while other GCC countries have several restrictions controlling their distribution [3]. As a result of these legal restrictions on alcohol sales, a large proportion of alcohol use is unrecorded [1]. Counterfeit, including homemade alcohol, is one of the primary sources of unrecorded alcohol use [6]. Counterfeit alcohol could be referred to as fake alcohol, adulterated, or home-produced alcohol. This is usually illegal and unrecorded alcohol production. The use of counterfeit alcohol is associated with severe outcomes, including intoxication, hazardous drinking, alcohol-related liver injury, and death [7, 8].

Due to the restrictions on alcohol use in Islamic countries, there is limited public awareness of the harmful impact of alcohol misuse [9]. The lack of awareness acts as a barrier to recognising alcohol-related problems, further contributing to the health harms of alcohol misuse in Muslim communities [9]. It is, therefore, essential to examine Muslim's views on safe alcohol use. This will guide public health interventions on sensitive topics in conservative and religious communities. This study aimed to investigate Muslims' perceptions and views of raising awareness on safe alcohol use and counterfeit alcohol harms in Islamic countries.

## Methods

This study employed a qualitative research approach using semi-structured interviews. Qualitative methodology allows for exploring people's accounts to gain a comprehensive understanding of their views towards sensitive health topics (e.g., alcohol use) [10]. This study design is suitable for studying subtle factors affecting people's perceptions, including social norms and religion, which could not be easily explored using quantitative methods.

This study is part of a larger project exploring GCC communities' perceptions of public health awareness programs regarding controversial topics in Islamic culture. It was reviewed and approved by the King Saud University Human Research Ethics Committee (approval number: KSU-HE-21-151).

### Sampling and recruitment

A purposive sample was used to identify male and female individuals from different geographical regions in the GCC and different age groups. We aimed to recruit people aged 18 and above from the GCC. Recruitment was conducted through social media. An invitation was posted on Twitter containing information about the research aims and a link to an information sheet and consent forms. Potential participants interested in participating in the study filled in the electronic informed consent form and provided information on their preferred method of contact. Interested participants were contacted by the primary investigator (SA) via their preferred method of communication (i.e., email or phone) to schedule the interview.

### Data collection

A demographic questionnaire was given to each participant before the interview for descriptive data. The questionnaire included participants' gender, age, education, employment, and country of residence. Data on the type of employment was not collected to preserve participants' anonymity and facilitate recruitment. The interviews were conducted online via Zoom, allowing people from all over the GCC region to participate. Interviews were conducted by the lead author (SA), a Saudi female public health researcher experienced in qualitative research. Interviews were audio-recorded with participants' approval. Interviews took place between March and April 2021 and ranged between 20 and 60 min.

A topic guide was developed based on the literature examining people's perceptions and experiences of raising awareness on sensitive topics. The Social Norms Theory guided topic guide questions [11]. The theory suggests that people's perceptions of a "norm" could encourage or discourage the expression of their true opinion and behaviour, therefore falsely providing a

confirming view rather than what they believe is acceptable [11]. People's responses are likely influenced by their beliefs of what is socially acceptable. This was explored by carefully phrasing questions, allowing participants to share more controversial views. For example, asking participants about their peers' views on alcohol and discussing alcohol consumption in their community and social circle rather than asking about their personal views and own alcohol use. The topic guide also included questions about people's perceptions of the factors facilitating or hindering alcohol-related public health interventions in GCC communities. Participants were free to discuss any relevant areas not covered by the guide. The topic guide was piloted with one participant and amended before the start of the data collection.

#### Data analysis

All audio recordings were transcribed verbatim. A reflexive thematic analysis method was followed [12], and ATLAS.ti software was used for data management and coding. All transcripts were coded using an inductive approach by the lead author (SA), and a sample of interviews was double-coded by the second author (NA). Meetings between researchers were conducted to discuss and amend the codes throughout the analysis process. Codes were grouped to produce the preliminary thematic framework. SA & NA iteratively refined the thematic framework, and the authors continuously reviewed interview transcripts to ensure that the findings reflected the data. All themes and sub-themes were developed via discussions between research team members to improve rigour and reliability. The quotes presented in the findings were independently translated from Arabic to English by two authors (SA and NA), who then jointly agreed on the final translation.

**Table 1** Participants characteristics

<b>Gender</b>	Male	11
	Female	12
<b>Educational level</b>	Secondary	1
	Diploma	2
	Bachelor	12
	Postgraduate	8
<b>Age</b>	18–25 years old	8
	26–33 years old	6
	34–40 years old	5
	41–50 years old	4
<b>Marital status</b>	Single	14
	Married	7
	Widowed	1
	Divorced	1
<b>Country</b>	Saudi Arabia	10
	Kuwait	6
	Oman	5
	United Arab Emirates	1
	Bahrain	1

## Results

Twenty-three participants took part in this study. We had a diverse sample of male and female participants aged 18 to 50. Study participants' characteristics are detailed in Table 1. Five themes were identified from the data, including perceptions on alcohol use in the GCC, the community's openness to alcohol discussions, approaches to raising awareness on alcohol use, all forbidden is desirable, and Legalisation is a solution.

### Perceptions of alcohol use in the GCC

All participants believed that alcohol consumption is common in GCC countries, even in countries where it is illegal, such as Saudi Arabia and Kuwait. Some participants believed that alcohol use in GCC countries has only occurred in recent years, while others believed that it has always existed, but people have started to talk about their consumption more openly in recent years.

*"Let's say, people who drink, for example, in Kuwait, this thing does not exist legally, but it exists, I mean, there are people who drink." (P1, Female, 34–40 years old, Kuwait).*

*"SA: Do you think drinking alcohol is common in Gulf societies?"*

*P9: I expect it to be a lot, like a lot, not uncommon." (P9, Male, 26–33 years old, Saudi Arabia).*

Participants stressed the importance of raising awareness about alcohol consumption due to its prevalence in the GCC region. They emphasised the necessity for health organisations and authorities to play an active role in shedding light on this issue.

*"The Ministry of Health, I expect that even if alcoholic drinks are prohibited in our country, I mean, they are aware that there is a large group that drink alcohol, so silence and denial will not solve the issue. They should talk about it and educate them." (P11, Male, 18–25 years old, Saudi Arabia).*

A participant noted that a considerable number of GCC nationals consume alcohol, which could potentially facilitate open dialogues and promote awareness regarding this issue.

*"Most of the senior officials are involved in this matter [drink alcohol]...I mean most of them, I mean I don't know why, but this is so widespread, I expect they are ready to speak about it, yeah." (P18, Male, 18–25 years old, Oman).*

The lack of data on alcohol consumption in the GCC, which includes alcohol misuse and counterfeit alcohol,

diminishes the gravity of the issue and complicates efforts to estimate the extent of alcohol misuse in the region. Some participants argued that the refusal to acknowledge alcohol consumption is influenced by religious beliefs, hindering national-level initiatives to address the matter. Participants highlighted that recognising the existence of alcohol consumption is the initial step in tackling it.

*“When you are providing an awareness message on this subject [alcohol use], you admit that it exists... the solution to the problem, as they say, starts from acknowledging its existence, not concealing it, or denying it, no, the solution of the problem is that it really does exist.” (P1, Female, 34–44 years old, Kuwait).*

### Community's openness to alcohol discussions

Residents of countries where alcohol is legal tend to have more tolerant attitudes toward alcohol use compared to those in countries where alcohol is illegal. They often draw parallels between alcohol consumption and taboo subjects like extramarital sexual activities, believing that alcohol consumption is viewed as less sensitive and more likely to be accepted by the community.

*“Sexual activities have consequences for the person himself and other people, for example, if they get pregnant and the baby is a consequence, the pregnant girl has lost her honour and these things, I mean consequences for other people, not only the person themselves is harmed, but in alcohol consumption and drugs, it is harmful only to the person himself, not others.” (P13, Female, 26–33 years old, Oman).*

Some participants believed that there is a potential societal openness towards alcohol use discussions due to its commonality among GCC communities. Thus, it was believed that raising awareness would be acceptable and should be targeting everyone in society.

*“I feel there is no shyness when it comes to this subject [alcohol use], I mean, for example, the issue of sexual diseases and these things, I feel that this [alcohol use] is accepted and for everyone.” (P3, Female, 18–25 years old, Saudi Arabia).*

Participants highlighted that academics and researchers need to have an active role in starting the discussion on alcohol use and misuse and provide scientific evidence and recommendations on how to deal with the issue.

*“Trust me, it is our responsibility as academics to start. We must begin research on alcohol...It's a big responsibility on our shoulders that we must start. We must educate our students and raise awareness. Awareness is still important, even if 1% of the population would benefit. It is still a positive leap in our society.” (P12, Male, 41–50 years old, Kuwait).*

### Approaches to raising awareness of alcohol

Participants held varying perspectives on alcohol awareness in conservative Muslim societies. One group advocated for discouraging alcohol consumption, whereas another group recommended promoting an understanding of safe alcohol consumption.

### The use of religious messages

For people who are against alcohol use for religious reasons, the only acceptable form of awareness is that alcohol use is harmful in any quantity, emphasising the Islamic prohibition of alcohol use (i.e., alcohol is a major sin). It was also highlighted that people should not be provided with any information on safe alcohol use.

*“Yes, of course; however, teaching them what is real alcohol and fake alcohol surely should not be a part of it [awareness], but raising awareness about the harms of this behaviour [alcohol use] in general, this is a must.” (P9, Male, 26–33 years old, Saudi Arabia).*

*“In my point of view, especially in Saudi Arabia and Kuwait, this thing [Alcohol awareness] will be very, very successful because, let's be honest, Saudi and Kuwaiti societies are still religious; the majority of people there are extremely religious... I mean this thing [Alcohol awareness] can be approached from a religious standpoint... so you get the support from society...” (P15, Male, 18–25 years old, Oman).*

Several participants suggested including the religious, social, physical, and psychological consequences of alcohol consumption. Many emphasised the importance of appealing to individuals' religious beliefs, recognising the significant influence of religious teachings on Muslim conduct. However, some pointed out that the effectiveness of these messages would depend on the individual's level of religious observance.

*“We need to approach this [awareness] from different angles. Firstly, it is Haram. Second, it will impact your health. Third, even psychologically, it will harm you. When I come from multiple angles, surely one of these points will appeal to them or affect their*

*behaviour. When I appeal to the person's religiosity, it won't necessarily work. Even though we are all Muslims, not all of us are at the same level of religiousness. So, talking about other harms [other than religion] will work." (P2, Female, 26–33 years old, Saudi Arabia).*

#### **Raising awareness on safe alcohol use**

Some participants emphasised the importance of health authorities actively promoting awareness about responsible alcohol consumption. This includes educating the public about moderate alcohol use, legal limits, the dangers of counterfeit alcohol, and the harms associated with alcohol abuse. Some participants argued that moderate alcohol consumption is not detrimental to health. Therefore, presenting all alcohol consumption as harmful is seen as misleading and inaccurate.

*"When you say alcohol is harmful in any quantity, they will say, what about people who drink in countries where it is legal and not forbidden by religion? They are fine, and that's true! Why isn't alcohol harming their health? That's because they know the safe limits and drink accordingly. However, when it comes to us, there is no safe limit, and youth don't know how to moderate their drinking. They drink 24/7, but that is not the case abroad. They are informed on how to drink safely." (P16, Female, 41–50 years old, United Arab Emirates).*

The participants stressed the importance of increasing awareness about counterfeit alcohol, a significant issue in most GCC countries. All participants expressed worries about the health hazards associated with counterfeit alcohol. They emphasised that the sensitivity of discussing alcohol consumption was insignificant compared to the life-threatening impact and fatalities caused by counterfeit alcohol.

*"We have to talk about this, and it's very important... it is necessary for sure to talk about it because two days ago, someone died in Kuwait from this [counterfeit alcohol], and I read that there have been more cases like this in the past month and the past week, many girls died because of counterfeit alcohol." (P4, Female, 26–33 years old, Kuwait).*

Some participants were concerned about raising awareness of counterfeit alcohol and the potential consequences of such efforts on alcohol consumption. They raised the point that shedding light on the issue of counterfeit alcohol may unintentionally promote and normalise alcohol consumption, thereby encouraging its use.

*"I fear that if you raise awareness about counterfeit alcohol, it will be understood as giving people the green light to drink alcohol. Because you are telling them, "Don't drink counterfeit alcohol, drink the real thing." So, I feel like we should say that alcohol use is harmful regardless and briefly mention the specific risks of counterfeit alcohol." (P19, Female, 18–25 years old, Oman).*

#### **All forbidden is desirable**

Some participants attributed alcohol abuse and the consumption of counterfeit alcohol to the alcohol prohibition in some GCC countries. Participants believed that because alcohol is prohibited, it makes it more appealing and more likely for people to abuse it when available. They also explained that since alcohol production and sales are illegal, the only option for many people is counterfeit alcohol.

*"Because everything that is forbidden is desirable, I mean, they will definitely turn to these things [counterfeit alcohol]. If alcohol were legal, they would not have to turn to illegal fake products." (P5, Female, 26–33 years old, Saudi Arabia).*

*"From my point of view, it is always the ban that will make it [alcohol] desirable. We are indeed Muslims, but as they say, everything that is forbidden is desirable. It makes people want it more." (P21, Male, 18–25 years old, Oman).*

#### **Legalisation is the solution**

Some participants suggested that legalising alcohol could be the solution to controlling alcohol misuse. Participants used the example of the United Arab Emirates, where alcohol is permitted. They explained that legalising alcohol led to the implementation of regulations and policies to control alcohol consumption and reduce the harmful effects of alcohol misuse, such as driving under the influence.

*"Here in the Emirates, I wouldn't say we are not religious or too open as a society. But we do have places to drink alcohol. We don't see anything wrong with that... If he is over the age of 21 and wants to drink, he will go to a well-known place with trusted alcohol products ... These places are regulated, and their products come from well-known sources. We have never had issues with counterfeit alcohol. These are issues you only experience in Saudi Arabia and Kuwait. And you see it a lot there but never here."*

(P16, Female, 41–50 years old, United Arab Emirates).

Some participants were concerned that banning alcohol is denying any issues related to alcohol misuse, therefore exacerbating problems associated with unregulated alcohol use. It would be challenging to work towards solving an issue when it is perceived as non-existent. By not acknowledging the existence of alcohol use, issues like driving under the influence and underage drinking are unregulated and undocumented.

*“Here [in Emirates], you can drink under certain conditions; you must be over twenty-one, but less is not allowed. Driving while drunk is illegal... We have awareness clinics and health clinics. Alcohol addiction is not a crime; they do not imprison you for it, but there are health facilities; we have health centres that treat them as you would with a drug addict.”* (P16, Female, 41–50 years old, United Arab Emirates).

Issues with counterfeit alcohol can exist in countries where alcohol is legal. Participants used the example of Oman, where alcohol is legal yet limited. The limited availability of alcohol makes counterfeit alcohol the cheaper, more accessible option, particularly for youth.

*“We in Oman are allowed to have these things [alcohol], but most people who drink these [alcohol] drinks resort to counterfeit drinks because they are cheaper.”* (P15, Male, 18–25 years old, Oman).

## Discussion

In this study, we examined Muslims’ perceptions and views on raising awareness of safe alcohol use and misuse in Islamic countries. All participants acknowledged the existence of alcohol use in GCC communities and advocated for the need to raise public awareness about the harms of alcohol use. Opinions on approaches to raising awareness varied. Some participants suggested focusing awareness on the religious messages prohibiting alcohol use, emphasizing that alcohol is harmful in any quantity. For some, raising awareness of safe alcohol consumption was viewed as accepting and encouraging alcohol consumption, which goes against Islamic religious beliefs. Participants living in countries where alcohol is legal argued that the legalisation of alcohol could facilitate the provision of policies to regulate it, reducing the negative consequences of alcohol misuse.

Since alcohol is prohibited in Islam, its distribution and use are illegal or restricted in many GCC countries. It is assumed that alcohol use is uncommon in the GCC.

Therefore, alcohol use is either unmeasured or under-recorded in many Muslim countries [13, 14]. However, there was a consensus among research participants that many Muslims drink alcohol, even in countries where alcohol is illegal. This was consistent with existing evidence on alcohol use among Muslims [15]. Several reports also show that driving while intoxicated, underage drinking and counterfeit alcohol are existent issues in Muslim countries [3, 15, 16]. The lack of nationwide surveillance on alcohol use in Muslim countries makes it difficult to measure the magnitude of alcohol-related problems. The lack of data challenges the need for public health interventions and policies tackling harmful alcohol use. Therefore, there is a need to conduct population-based surveys to identify potential public health issues and high-risk populations. There is also a need to evaluate the effectiveness of current and future policies in the region to mitigate the impact of harmful alcohol use, especially among at-risk populations.

Religion and spirituality play a significant role in shaping individuals’ health-related behaviours, especially in the context of substance use. The implications of faith systems on health and health-related interventions are complex and can yield both negative and positive effects [17]. Research suggests that religiosity is associated with lower levels of substance use [18]. However, people living in religious communities might be less likely to share information about alcohol consumption openly [19]. In Islamic communities, openly declaring alcohol consumption is considered a major sin and can be viewed as encouraging other Muslims to consume alcohol [19]. This makes it challenging to gather accurate data on alcohol consumption in Muslim countries. Additionally, policy-makers may deny the existence of alcohol consumption in Muslim countries, leading to a lack of effective policies and interventions [20]. It is essential to balance religion’s influence on public health by acknowledging its positive impact on promoting health, supporting health initiatives, and addressing the unique challenges encountered in religious communities.

Initiating discussions about alcohol can be complex due to religious and social sensitivities, presenting challenges even in clinical settings [4, 9]. Healthcare professionals might hesitate to broach the topic of alcohol use, and their personal religious beliefs could influence their approach and treatment of patients who consume alcohol [4, 9]. In Muslim communities, healthcare professionals may lack the necessary skills to provide alcohol-related counselling [4, 9]. The absence of alcohol discussions in clinical settings can have profound health implications [3, 21]. It is imperative to examine the factors that either facilitate or impede discussions about alcohol from the perspective of healthcare professionals. Understanding their perspectives and experiences is crucial, as they play

a vital role in identifying and addressing alcohol misuse. Developing clinical guidelines for responsible alcohol consumption is recommended to equip healthcare professionals with the necessary tools to effectively support and respond to the individual needs of their patients.

Muslim participants living in countries where alcohol is legal had tolerant views about alcohol use. This implies that although religious views influence public perceptions, laws and regulations may have a more significant influence on people's perceptions and behaviours. Research participants suggested that legalisation of alcohol consumption may reduce the production and use of counterfeit alcohol. It was also believed that legalisation would facilitate the provision of policies that would minimise the negative impact of alcohol misuse. In Islam and many other religions, human life and health are a priority; therefore, they must be protected at all costs [22]. It has been suggested that harm reduction policies and interventions implemented in Muslim communities could reduce harmful consequences of substance abuse, including alcohol abuse [23]. Due to the numerous harms associated with alcohol abuse and counterfeit alcohol, prevention of harm should be achieved through the provision of effective services and policies.

Although participants expressed concerns about raising awareness on safe alcohol consumption and offending religion, a harm reduction approach was believed to be a necessary offence. Since alcohol is prohibited in Islam, the social implications for alcohol use can be severe in Muslim communities. Imams (Islamic religious leaders) in the United States called for the de-stigmatisation of alcohol use and having open and forgiving communication with Muslims who drink alcohol [24]. It was suggested that viewing alcohol use as a sinful and shameful act may increase the stigma and exclusion of Muslims who choose to drink alcohol [24]. The stigmatisation of alcohol use and the complexity of addressing alcohol misuse are experienced in many other religious communities, including Christianity and Judaism [25, 26]. Conservative individuals who place a value on religion felt more comfortable accessing programs that were religiously and culturally sensitive [25]. A stigmatising environment may cause people to hide their alcohol use. This can lead to missed opportunities to reduce the harmful implications of alcohol misuse. Although challenging, there is a need to combine a public health perspective on alcohol use while providing messages that acknowledge the religious aspect in religious communities.

### Strengths and limitations

This is the first study, to our knowledge, to examine Muslims' perceptions and acceptance of safe alcohol use across different countries in the GCC. We included participants from GCC countries, providing a chance to

explore the views of people living in countries with varying social, economic, and political environments.

The possibility of social desirability bias could not be eliminated when discussing taboo subjects such as alcohol use in conservative religious communities. We tried to reduce desirability bias by avoiding showing any emotional reactions toward participants' responses and following a non-leading approach in interview questions. Participants were encouraged to provide honest and private accounts by ensuring privacy and confidentiality throughout the research process. We were unable to ask participants directly about their alcohol consumption due to religious and cultural unacceptability. We were only able to recruit participants from some GCC countries, such as Qatar. The results reflect the views of people who may be more tolerant and liberal than those who chose not to participate in the study. Recruiting through social media platforms allows for reaching a diverse sample across a wide geographical area [27]. However, it is essential to recognise the limitations of this method. Depending solely on social media for recruitment may introduce a selection bias, potentially leading to the underrepresentation of certain demographic groups in the sample. This could affect the overall diversity and representativeness of the study's participants [27].

### Conclusions

Many Muslims acknowledge the existence of alcohol use in their communities. Participants were hesitant about raising awareness of safe alcohol use. Although challenging, there is a need to combine the public health perspective on safe alcohol use while providing messages that acknowledge the religious aspect. There is also a need to evaluate the effectiveness of current and future policies in the GCC region to mitigate the impact of harmful alcohol use, especially among at-risk populations.

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### Author contributions

SA & NA authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by SA. NA contributed to the analysis, interpretation of the data and the writing of the results. The first draft of the manuscript was written by SA. NA commented and edited further versions of the manuscript. All authors read and approved the final manuscript.

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### Data availability

The datasets generated and analysed during the current study are not publicly available due to the lack of consent to share raw material, but parts of the material can be available from the corresponding author upon reasonable request.

## Declarations

### Ethics approval and consent to participate

This study was reviewed and approved by the King Saud University Human Research Ethics Committee (approval number: KSU-HE-21-151). The IRB approved study procedures relating to informed consent, and all approved consent procedures were followed. All methods were carried out in accordance with relevant guidelines and regulations.

### Consent for publication

Not applicable.

### Competing interests

The authors declare no competing interests.

### Conflict of interest

The authors declare that they have no competing interests.

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