

The Level of Public Awareness About Clubfoot in The Al-Qassim Region and Importance of Early Childhood Intervention: A Cross-Sectional Study

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ABSTRACT

Background: Clubfoot is a childhood congenital abnormality that can lead to disabilities, which can last a lifetime if untreated. There are several types of interventions to treat this condition. However, these interventions depend on the age of presentation and result in good outcomes if started early. This study aimed to investigate the level of public awareness about clubfoot in the Al-Qassim region in Saudi Arabia.

Method: This observational cross-sectional study was conducted on a population living in the Al-Qassim region in 2020. The study was conducted using a structured, validated questionnaire that was available online. The chi-square test and t-test were used to analyze the data. All the analyses were conducted using SPSS (version 21).

Results: This study included 7085 individuals from the Al-Qassim region. The level of public awareness was as follows 15.6% had poor knowledge, 43.8% had fair knowledge, and 40.6% had high knowledge. The most common sources of knowledge were relatives and friends (42.55%)

and websites (29.83%). A multivariate analysis showed that several factors affected the levels of knowledge, including gender ($P < 0.0001$), having an affected child ($P < 0.0003$), certain sources of information, affected persons ($P < 0.005$), relatives and friends ($P < 0.0001$), websites ($P < 0.0001$), and printed media ($P < 0.0001$).

Conclusion: A moderate level of knowledge was found among the population in the Al-Qassim region. Their knowledge level was affected by several factors, such as the source of information. Therefore, educational interventions, such as campaigns, are needed to improve the awareness level, leading to better outcomes.

Keywords: Clubfoot, Awareness, General population, Al-Qassim, Serial casting, misconception, Early Interventions

INTRODUCTION

Clubfoot is a congenital structural deformity characterized by forefoot adduction, midfoot cavus, and hindfoot equinus. It is the most common musculoskeletal birth defect worldwide and affects males more than females [1,2]. Clubfoot may affect one foot or both and is usually idiopathic [3]. The global prevalence of clubfoot was reported to be within 0.6–1.5 per 1000 live births [4]. However, one study reported that the incidence of clubfoot was 1.9 per 1000 births, with a male to female ratio of 1:0.85 [5]. Additionally, the male-to-female ratio was reported to be 2:1 in America and the United Kingdom [6]. In Saudi Arabia, skeletal anomalies are the second-most common major congenital anomaly, among which, clubfoot is the most prevalent [7].

Clubfoot is diagnosed clinically; nevertheless, ultrasound (US) can be used for antenatal diagnosis [8]. Early treatment for clubfoot can correct foot deformity without surgical intervention. However, delay in treatment makes it more difficult to manage non-surgically [9] and adds the risk of worse clinical and radiographic outcomes associated with the operative interventions [10]. If left untreated, clubfoot can cause severe pain during walking and an inability to wear shoes, leading to a lifelong disability [11]. Therefore, proper and timely management of clubfoot is crucial. Treatment procedures of clubfoot can be operative and non-operative. Non-operative interventions include casting and serial manipulation [12], whereas operative strategies are used for individuals with a later-stage clubfoot diagnosis or after the failure of non-operative interventions. The risk of relapse exists; therefore, follow-up is essential after treatment [13].

Early identification and management of clubfoot depend on public awareness of such conditions [9]. This study was conducted in the Al-Qassim region because many local clinicians noticed that several cases presented at a later stage, with an advanced condition that needed to be treated and required referral to a higher center for surgical interventions. This study aimed to investigate the level of awareness among the population and their resources of information versus validity, as well as discuss the predictors of poor knowledge among individuals and common misconceptions about clubfoot.

MATERIAL AND METHODS

Study design and subjects: This observational cross-sectional study was conducted among public citizens in the Al-Qassim region and was spanned for four months (June to September 2020). The study was conducted using a structured validated questionnaire [13] and translated into Arabic by two medical translation specialists. The survey was available online using SurveyMonkey.com and distributed over social media in cooperation with different influencers to include all living citizens in the Al-Qassim region of both genders, different educational levels, and all age groups. Additionally, we made a doubled questionnaire to verify the living region of the participants; therefore, we excluded all individuals from other regions of Saudi Arabia and different countries. Additionally, we used SurveyMonkey.com to limit the participants from filling the survey more than once.

The minimal calculated sample size ($n = 318$) was calculated using Raosoft.com, with a 5% margin of error, 95% confidence level, and 30% response distribution. We added 10% of incomplete data and non-responses.

The survey included closed-ended (Yes/No) and multiple-choice questions regarding the participants' awareness and beliefs about clubfoot. The self-administered questionnaire included questions about sociodemographic data (age, gender, marital status, educational level, and residential city), experience and awareness about clubfoot, along with the source of that information. This section was followed by 11 main questions about the risk factors and treatment lines regarding clubfoot. We provided a simple introduction and illustrative clinical figures for the participants.

Two clinical orthopedic consultants and one assistant professor of family and community medicine designed the scoring system to define the level of knowledge about clubfoot. The level of knowledge is defined under three categories (poor, fair, and good), with a total of seven marks (1–2=poor, 3–4=fair, and >5=good). The distribution of marks was designed based on the evidence on that respective answer—the stronger the evidence, the higher the mark. The score for knowledge was dependent on these three topics (initial management of clubfoot, appropriate age

to treat clubfoot, risk factors for clubfoot) that were the only marked questions (2 marks for cast, birth to first 12 months, hereditary and genetic diseases), (1 mark for cast, 1 6-12 months, intrauterine deficient amniotic fluid) with zero marks for others.

Ethical considerations: The study was approved by a subcommittee of Health Research Ethics, Deanship of Scientific Research, Qassim University, Qassim, Saudi Arabia (Approval No. 19-11-04 on May 5, 2020), which is in accordance with the National Committee of BioEthics guidelines. Participants were informed about the goal of the study and their rights to fill the survey with the ability to withdraw at any time without any reward for participation. Written informed consent for publication of the study was obtained.

Statistical analysis: The collected data were analyzed using the SPSS program (version 21). Numbers and percentages were used to represent qualitative data, and the chi-square test and t-test were used to compare different variables depending on the type of the variable. P-value was considered significant at ≤ 0.05 .

RESULTS

The study included 7085 participants; out of the participants, 2969 (41.91%) were adults aged 21-30 years, 4910 (69.31%) were females, and 2287 (39.91%) were educated. Moreover, the level of knowledge was high for 2867 (40.6%) participants, fair for 3109

(43.8%) participants, and poor for 1109 (15.6%) participants (Figure 1). Table 1 shows the demographic characteristics of the participants and their knowledge scores. There was a significant difference between males and females and the age groups regarding the knowledge score ($P < 0.0001$). Furthermore, 48.55% of all participants were unmarried; there was a significant difference between the different marital statuses of the participants ($P < 0.0171$). Regarding the educational level, 39.91% of the participants had a bachelor's degree, 26.02% were undergraduates, 18.25% were in secondary school or less, 12.03% had a diploma, and 3.80% had higher education levels. Participants' education level also accounted for significant differences between their level of knowledge about clubfoot ($P < 0.0001$). Among the participants, 49.83% were from the Buridah region. The level of knowledge of these participants significantly differed from that of the participants from different regions. Notably, more than half of the participants (65.5%) had not heard of clubfoot before, which accounted for a significant difference between participants who heard and did not hear about clubfoot ($P < 0.0001$). Additionally, some participants (4.29%) reported having a child with clubfoot. This also accounted for a significant difference in the knowledge score between participants having a child with clubfoot and those who did not ($P < 0.0001$).

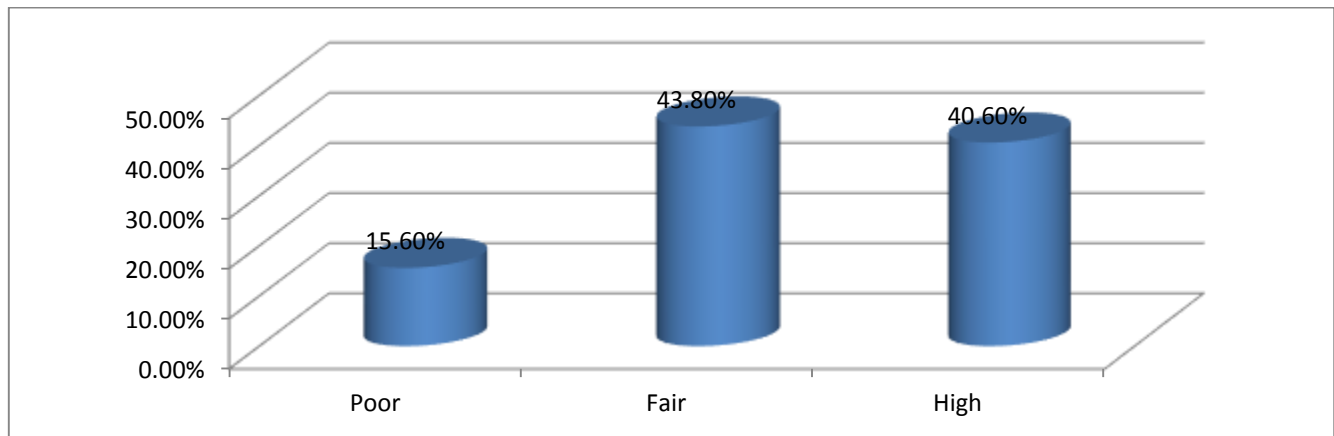


Fig1: The score of knowledge of participants

Table1: Demographic characteristics of respondents including their perceived causes, attitudes, and beliefs regarding clubfoot and its treatment (n= 7085)

Variables	Frequency N Percent %	Score			P-value
		Poor N=1109	Fair N=3109	High N=2867	
Gender					<.0001
Male	2174 (30.69)	448 (40.40)	966 (31.08)	760 (26.51)	
Female	4910 (69.31)	661 (59.60)	2142 (68.92)	2107 (73.49)	
Age					<.0001
≤ 20 years	1101 (15.54)	195 (17.58)	495 (15.93)	411 (14.34)	
21-30 years	2969 (41.91)	456 (41.12)	1227 (39.48)	1286 (44.86)	
31-40 years	1518 (21.43)	238 (21.46)	660 (21.24)	620 (21.63)	
41-50 years	1035 (14.61)	151 (13.62)	488 (15.70)	396 (13.81)	
≥51 years	461 (6.51)	69 (6.22)	238 (7.66)	154 (5.37)	
Marital status					0.0171
Single	3440 (48.55)	563 (50.77)	1436 (46.19)	1441 (50.26)	
Married	3373 (47.61)	504 (45.45)	1546 (49.73)	1323 (46.15)	
Divorced	192 (2.71)	34 (3.07)	89 (2.86)	69 (2.41)	
Widowed	80 (1.13)	8 (0.72)	38 (1.22)	34 (1.19)	

Educational level					
Secondary school or less	1293 (18.25)	234 (21.10)	589 (18.95)	470 (16.39)	<.0001
Diploma	852 (12.03)	155 (13.98)	393 (12.64)	304 (10.60)	
Undergraduate degree	1843 (26.02)	289 (26.06)	784 (25.23)	770 (26.86)	
bachelor's degree	2827 (39.91)	386 (34.81)	1233 (39.67)	1208 (42.13)	
Higher studies	269 (3.80)	45 (4.06)	109 (3.51)	115 (4.01)	
Residential city					
Others	696 (9.82)	106 (9.57)	324 (10.42)	266 (9.28)	0.0028
Buraidah	3530 (49.83)	585 (52.80)	1561 (50.21)	1384(48.27)	
Unaizah	1537 (21.70)	232 (20.94)	614 (19.75)	691 (24.10)	
ArRass	776 (10.95)	112 (10.11)	368 (11.84)	296 (10.32)	
Al-Muthnib	273 (3.85)	31 (2.80)	124 (3.99)	118 (4.12)	
Al-Badayea	272 (3.84)	42 (3.79)	118 (3.80)	112 (3.91)	
Heard about Clubfoot					
No	4640 (65.50)	770 (69.43)	2108 (67.82)	1762 (61.46)	<.0001
Yes	2444 (34.50)	339 (30.57)	1000 (32.18)	1105 (38.54)	
Have a child with Clubfoot					
No	6781 (95.71)	1043 (94.05)	2956 (95.08)	2782 (97.04)	<.0001
Yes	304 (4.29)	66 (5.95)	153 (4.92)	85 (2.96)	
You know cause you have a child with Clubfoot ¹ :					
No	64 (21.05)	12 (18.18)	38 (24.84)	14 (16.47)	0.2568
Yes	240 (78.95)	54 (81.82)	115 (75.16)	71 (83.53)	

Includes only the respondents who are parents of an affected child with Clubfoot (n=304)

Figure 2 shows the common sources of participants' information. The most common sources were relatives and friends (42.55%), followed by websites (29.83%), social media (25.82%), affected persons (25.37%), printed media (18.29%), and television and radio (4.71%).

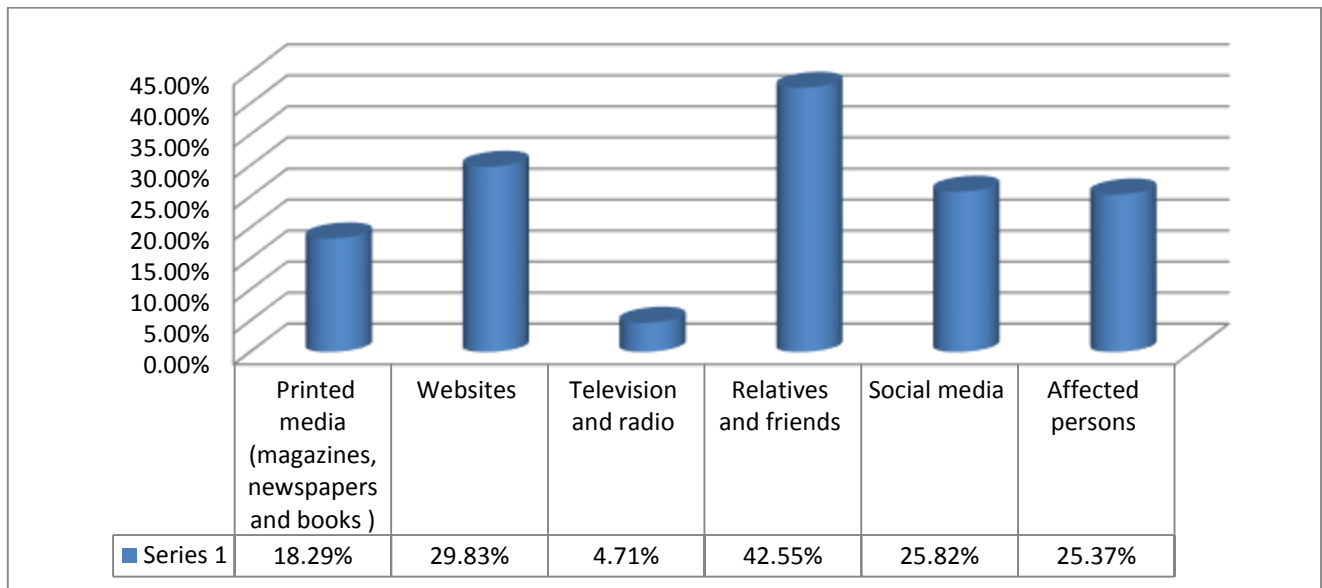


Fig2: The common sources of information on Clubfoot among participants who heard about Clubfoot

Employing a multivariate logistic regression analysis, after adjusting the demographics of the general population and those having affected children, we found that gender (P<0.0001), having an affected child (P<0.0003), and certain sources of knowledge, including relatives and friends (P<0.0001), websites (P<0.0001), printed media (P<0.0003), social media (P<0.0001), and affected persons (P<0.005), significantly affected the level of awareness (Table 2).

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Table 2: Multivariate logistic regression analysis to examine the impact of the level of awareness on the general population after adjusted form of demographics and having an affected child

Independent variable		adjusted odds ratio	95%CI for AOR		P-Value
			Lower	Upper	
Gender	Male	Ref			
	Female	1.882	1.610	2.199	<.0001
Age (years)	21-30 years	Ref			
	31-40 years	1.004	0.788	1.280	0.9719
	41-50 years	1.069	0.806	1.418	0.6416
	≥51 years 7	1.039	0.721	1.499	0.8359
	≤ 20 years	0.820	0.650	1.036	0.0958
Marital status	Single	Ref			
	Divorced	0.723	0.451	1.161	0.1796
	Married	0.980	0.778	1.234	0.8607
	Widowed	1.629	0.709	3.740	0.2501
Educational level	Undergraduate	Ref			
	Diploma	0.826	0.629	1.086	0.1707
	Higher studies	0.983	0.656	1.473	0.9331
	Secondary school or less	0.832	0.660	1.049	0.1205
	bachelor's degree	1.179	0.957	1.451	0.1218
Residential city	Buraidah	Ref			
	Al-Badayea	1.190	0.813	1.741	0.3705
	Al-Muthnib	1.513	0.993	2.303	0.0538
	ArRass	1.058	0.825	1.355	0.6574
	Others	1.022	0.793	1.316	0.8681
	Unaizah	1.142	0.950	1.375	0.1581
Having affected child	No	Ref			
	Yes	0.515	0.361	0.736	0.0003
Printed media	No	Ref			
	Yes	2.688	2.022	3.574	<.0001
Websites	No	Ref			
	Yes	2.178	1.792	2.648	<.0001
Television and radio	No	Ref			
	Yes	1.142	0.758	1.720	0.5244
Relatives and friends	No	Ref			
	Yes	1.516	1.239	1.853	<.0001
Social media	No	Ref			
	Yes	2.262	1.862	2.748	<.0001
Affected persons	No	Ref			
	Yes	1.407	1.109	1.786	0.0050

Table 3 shows the knowledge about the treatment of clubfoot among those who heard and did not hear about clubfoot. There was a significant difference regarding the knowledge of different methods of initial management (P<0.0001) among participants who heard and did not hear about clubfoot. By investigating the appropriate age to treat clubfoot, there was a significant difference between the two groups (P<0.0001).

Table 3: Summary of responses regarding knowledge of treatment for Clubfoot (n= 7085)

Variable	Total (Yes + No)	Heard about Clubfoot		P-value
		No	Yes	
Initial management of Clubfoot				<.0001
Cast	3378 (47.71)	2104 (45.38)	1273 (52.11)	
Physiotherapy	2276 (32.15)	1535 (33.11)	741 (30.33)	
Surgery	1426 (20.14)	997 (21.51)	429 (17.56)	
Appropriate age to treat Clubfoot				<.0001
Birth to the first six month	3685 (52.06)	2508 (54.12)	1176 (48.12)	
First 6–12 months	2396 (33.85)	1483 (32.00)	913 (37.36)	
1–4 years	998 (14.10)	643 (13.88)	355 (14.53)	

The association between perception of clubfoot cases and hearing about clubfoot is shown in Table 4. There were significant differences between participants who heard about clubfoot and those who did not regarding the perception of evil eye and witchcraft (P<0.0001), neurological disorders (P<0.0001), hereditary and genetic reasons (P<0.0001), mispositioned fetuses (P<0.0099), and cesarean sections (P<0.0146).

Table 4: association between perception of causes of Clubfoot and Heard about Clubfoot

Variable	Total (Yes + No)	Heard about Clubfoot		P-value
		No	Yes	
Twin pregnancy	751 (10.60)	510 (10.99)	241 (9.86)	0.1441
Sex of the newborn	195 (2.75)	117 (2.52)	78 (3.19)	0.1087
“Evil eye” and witchcraft	249 (3.51)	196 (4.22)	53 (2.17)	<.0001
Neurological disorders	1628 (22.98)	1168 (25.17)	459 (18.78)	<.0001
Hereditary and genetic reasons	4083 (57.63)	2563 (55.24)	1520 (62.19)	<.0001
Mispositioned fetus	2812 (39.69)	1791 (38.60)	1021 (41.78)	0.0099
Cesarean section	380 (5.36)	271 (5.84)	109 (4.46)	0.0146
Intrauterine deficient amniotic fluid	1858 (26.22)	1224 (26.38)	634 (25.94)	0.7119

Table 5 shows the association between hearing about clubfoot and the improvement in different management strategies. There were significant differences between participants who heard and those who did not hear about clubfoot regarding improvement by physiotherapy ($P<0.0078$), improvement by serial casting ($P<0.0001$), and knowledge about patients with clubfoot requiring surgical intervention ($P<0.0090$).

Table 5: assessment of association between awareness and management of Clubfoot (n= 7085)

Variable	Total (Yes + No)	Heard about Clubfoot		P-value
		No	Yes	
Improvement by physiotherapy				0.0078
0-20 %	570 (8.06)	339 (7.32)	231 (9.46)	
21-40 %	1201 (16.97)	776 (16.75)	425 (17.40)	
41-60 %	1959 (27.69)	1309 (28.25)	649 (26.58)	
61-80 %	2215 (31.30)	1482 (31.99)	733 (30.02)	
81-100 %	1131 (15.98)	727 (15.69)	404 (16.54)	
Improvement by serial casting				<.0001
0-20 %	394 (5.57)	282 (6.09)	112 (4.58)	
21-40 %	905 (12.79)	647 (13.97)	257 (10.52)	
41-60 %	1604 (22.66)	1094 (23.61)	510 (20.87)	
61-80 %	2500 (35.32)	1611 (34.77)	889 (36.37)	
81-100 %	1675 (23.66)	999 (21.56)	676 (27.66)	
Improvement by surgery				0.0640
0-20 %	390 (5.51)	268 (5.79)	122 (5.00)	
21-40 %	783 (11.07)	504 (10.88)	279 (11.43)	
41-60 %	1437 (20.31)	961 (20.75)	476 (19.49)	
61-80 %	2425 (34.28)	1609 (34.74)	815 (33.37)	
81-100 %	2040 (28.83)	1290 (27.85)	750 (30.71)	
Clubfoot patients need surgical intervention.				0.0090
0-20 %	2843 (40.21)	1881 (40.64)	961 (39.35)	
21-40 %	2090 (29.56)	1315 (28.41)	775 (31.74)	
41-60 %	1283 (18.14)	836 (18.06)	447 (18.30)	
61-80 %	601 (8.50)	418 (9.03)	183 (7.49)	
81-100 %	254 (3.59)	178 (3.85)	76 (3.11)	

DISCUSSION

In this study, the level of knowledge regarding clubfoot among the general population in the Al-Qassim region was moderate, as 40.6% of the participants had high knowledge, 15.6% had poor knowledge, and 43.8% had fair knowledge. Only 34.5% of the participants had heard about clubfoot. The most common source of information regarding clubfoot included relatives and friends (42.55%), followed by websites (29.83%) and other sources that represented fewer percents.

A previous Saudi study [13] reported that there was a low public knowledge about clubfoot. Moreover, the study found that 30.3% of the participants had heard about clubfoot, which is similar to our findings. The most common sources of information, as reported by the above-mentioned study, included social media as the main source (38.4%), followed by relatives and friends (19.9%), websites (16.8%), and printed media (13.7%) [13]. A study from India conducted on parents having children with clubfoot showed that 93.3% of these parents did not know about clubfoot before their children had the condition [2]. In another study conducted on 113 parents, 72.3% knew what clubfoot was [1].

This study indicated that participants' level of knowledge is affected by several factors, including gender, age, marital status, educational level, residential city, hearing about clubfoot, and having a child with clubfoot. Among all these factors, the participants from Buraidah, the capital of the Al-Qassim region, have much poorer knowledge than the participants from other cities. As it had a higher population and good accessibility for the facilities, it can be a good reflection of the real level of knowledge as well. However, the multivariate logistic regression analysis showed that gender was the only demographic characteristic that significantly affected the level of knowledge; females had significantly more knowledge than males. Moreover, having a child affected by clubfoot was significantly associated with a higher level of knowledge among the parents and was a source of information for others. Other factors affecting the level of knowledge included all sources of media except for television and radio. This may be because of the recent reduction in the use of television and radio, owing to the greater usage of social media, websites, and printed media. This corroborates with a report from Saudi Arabia, which revealed that 92% of the Saudi population used the Internet, and

25 million Saudi individuals were active users on social media [14]. Despite that, the most common source of information on clubfoot for our study was relatives and friends (Figure 2), which may return to the social advice from the parents to the others about what the difficulties they had to do with their child (surgeries, referral to other cities, follow-up) because they are late with the presentation.

No previous study has reported any factor that may be associated with the level of knowledge about clubfoot.

Regarding knowledge about the treatment of clubfoot, there was a significant difference in terms of the initial management of clubfoot between the individuals who heard and who did not hear about clubfoot. The former reported cast as the initial management of clubfoot. This corroborates with a previous Saudi study, which found that individuals with an awareness of clubfoot reported cast as the first-line treatment, whereas a significant proportion of individuals with no awareness reported physiotherapy as the first-line treatment. Moreover, regarding the appropriate age to treat clubfoot, individuals who did not hear about clubfoot reported that birth to the first six months was the appropriate age for treatment. This finding is also similar to that of a previous study [13]. In another study, [9] participants reported that surgery was the most common treatment.

Both genetic and environmental factors cause clubfoot [8,15]. Moreover, it was reported that clubfoot is inherited as a polygenic multifactorial trait [15].

Regarding the perception of clubfoot causes, individuals who did not hear about clubfoot significantly reported evil eye and witchcraft, neurological disorders, and the cesarean section as the causes of clubfoot. Importantly, regarding the evil eye and witchcraft, there is a well-known religious belief and local culture (especially among the population who are less educated) that are usually the cause of such conditions as clubfoot; therefore, it does not require medical interventions. Contrastingly, individuals who heard about clubfoot reported hereditary and genetic reasons as well as malpositioned fetuses as the causes of clubfoot.

In a previous Saudi study, it was found that a significant proportion of individuals with awareness reported mispositioned fetuses as the cause of clubfoot, whereas there was no significant difference between individuals with and without awareness regarding other investigated causes, including twin pregnancy, sex

of the newborn, evil eye and witchcraft, neurological disorders, hereditary and genetic causes, and cesarean section [1].

A study from Pakistan revealed that participants had several beliefs regarding the causes of clubfoot, including solar and lunar eclipses, health status, religious explanations, genetics, and behaviors of the parents [9].

Regarding the association between awareness and management of clubfoot, a significant percentage of individuals who did not hear about clubfoot reported improvement by physiotherapy in 61 %–80%, whereas a significant percentage of individuals who heard about clubfoot reported that serial casting results in an improvement of 61 %–80%. A significant proportion of individuals who did not hear about clubfoot reported that 0 %–20% of clubfoot patients require surgical intervention.

Limitations: This study has the limitation of using a web-based survey for data collection. The Al-Qassim region had limited centers performing this type of surgery for patients who are late at the time of presentation. Furthermore, many families live in the peripheries far from hospitals; therefore, they fail to follow up even with conservative management.

Conclusion and recommendations: The population in the Al-Qassim region had a moderate level of knowledge about clubfoot and the treatment of this condition. The level of knowledge was affected by several factors, such as having an affected child, gender, and the source of information. This indicates that the citizens of Al-Qassim need to increase their awareness about clubfoot, as early diagnosis and interventions will lead to good outcomes [9,10]. Additionally, awareness reduces the cost of late presentation complication management.

Further studies are recommended to investigate the overall awareness in the whole Kingdom, include a larger sample size, and investigate other factors that may affect the level of knowledge. Additionally, the flow of patients who underwent surgical interventions with late presentation, prognosis, and outcomes. Educational interventions, such as campaigns, are needed to improve the awareness level, leading to better outcomes.

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