

## Knowledge and Attitude of Short Stature and Its Treatment in Saudi Arabia

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### Abstract

Both tall and short parents are concerned about their children's short stature. This study aimed to explore the knowledge about short stature (SS) and attitude towards its treatment among the general public of Saudi Arabia. This was a cross-sectional study that utilized an online-administered questionnaire distributed between August 2021 and March 2022. Binary logistic regression was conducted to identify factors that affect participants' knowledge. This study included a total of 6,852 individuals. The vast majority of the participants (77.5%) expressed satisfaction with their height. A total of 40.4% of participants stated that they were aware of a treatment option for their low height. With a mean score of 13.0 (SD:5.8) out of 25, the participants demonstrated a moderate level of knowledge of short stature (52.0%). The majority of participants (78.0%) stated that if they have a problem with short stature or want to enhance their own or their children's height, they are willing to consult a doctor about it. Participants living in the northern and eastern areas, those with bachelor degree, and those working in the healthcare field were more likely to be knowledgeable about short stature compared to others ( $p \leq 0.01$ ). Saudi Arabians have a moderate understanding of SS, which needs to be improved. Campaigns to increase the general public's and parents' knowledge about SS, which is ultimately connected to earlier diagnosis and better management outcomes, are needed. Additional research is required to examine the most effective strategies for raising public knowledge of SS.

**Keywords:** Attitude; knowledge, Saudi Arabia, short stature, survey

### Introduction

Growth is an ongoing biological process influenced by genetic, nutritional, environmental, and hormonal factors.<sup>1</sup> Short stature (SS) is described as being shorter than the third percentile of the population.<sup>2</sup> The diagnosis of short stature necessitates biochemical and radiological tests, such as nutritional evaluation, hormonal evaluation, and bone age estimation.<sup>1</sup> Growth is influenced by Ethnicity, lifestyle, diet, culture, and socioeconomic variables. As a result, the causes of SS in children in underdeveloped nations differ from those in rich countries.<sup>2</sup> Short stature can be detected using two methods. Firstly, SS is defined as a height less than 2 standard deviations (SD) for age and gender in the population or less than 2 SD of mid-parental height (MPH). Secondly, through serial growth monitoring, Growth faltering is defined as

crossing two centiles on a growth curve in the wrong direction.<sup>2</sup> In a previous study in India, 2.86% of children had SS.<sup>3</sup> In another study that was conducted in Egypt, the prevalence of SS was estimated to be around 17.0% and their main aetiologies were familial (40.8%) and constitutional (24.2%).<sup>4</sup>

One in every 3,500 people had growth hormone deficiency (GHD) (defined as a peak GH response to stimulation of less than 10 ng/dL).<sup>4</sup> Familial Short Stature (FSS), Constitutional Growth Delay (CGD), and GHD have been identified as the most common causes of SS in investigations worldwide. The modest discrepancy in SS prevalence reported by different studies is attributable to the different levels and types of health-care institutions.<sup>2</sup> Both tall and short parents are concerned about their children's short stature. Academics, career placement, leadership and performance, sports participation, and entrance into the glamour world have all been connected to the importance of height or stature. Depending on the height deficiency and the child's coping capacities, psychosocial stress connected with shortness is more stressful.<sup>5</sup>

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With the development in the Saudi population's economic situation and style of living, more parents are concerned about their children's growth. According to a previous survey in Saudi Arabia, SS is one of the most prevalent referrals to an adolescent endocrine clinic in Saudi Arabia.<sup>6</sup> A previous study in Saudi Arabia by El Mouzan et al.<sup>6</sup> reported that in comparison to the global prevalence of SS, the prevalence of short stature in Saudi children and adolescents is intermediate. To the best of our knowledge, previous studies in Saudi Arabia have yet to look into the Saudi population's knowledge of short stature and attitudes toward treatment. Exploring the general public's knowledge of short stature is critical because it aids in early diagnosis of the condition and seeking medical assistance, which is ultimately linked to better health outcomes for managed patients. This information can help with more accurate diagnosis, better handling related health problems, and creating focused solutions. This study aimed to explore the knowledge about SS and attitudes towards its treatment among the general public in Saudi Arabia.

## Methods

Between August 2021 and March 2022, a cross-sectional study was conducted utilizing an online-administered questionnaire. The questionnaire link was distributed through social media platforms (Facebook, Twitter, Snapchat, and Instagram) in order to reach a wider variety of participants from various sociodemographic groups. The study's aims and inclusion criteria were clearly mentioned in the questionnaire's cover letter. Before beginning the questionnaire, the participants were asked to provide their consent to take part. Participants who consented to offer their consent were told to begin filling out the questionnaire; otherwise, the survey was closed.

A convenient sampling technique was employed to invite the participants who met the inclusion criteria. All Saudi Arabians above the age of 18 and living in Saudi Arabia who were willing to participate were included in the study. Individuals under 18, who lived outside of Saudi Arabia, had mental problems, did not understand the Arabic language, and did not consent to participate were, however, excluded.

The study instrument was divided into three main sections and 33 questions (multiple choice and yes/no format), and it was based on

a thorough evaluation of the literature. The first section, which consists of ten items, looks into the sociodemographic characteristics of the study participants and whether they have heard about bone-lengthening operations. The second section consisted of five questions that probed their perceptions of their height compared to others and their concept of the ideal height. The third portion examined participants' understanding of short stature (13 items) and attitudes regarding treatment (5 items). The knowledge items covered the causes of short stature, clinical symptoms, diagnostic procedures, and treatment strategies. A consultant in orthopedics reviewed the questionnaire instrument for comprehensibility and understandability, and he confirmed it. The questionnaire was translated into Arabic and tested on a random sample of our study population to identify any concerns with context and content.

The questionnaire tool was evaluated and approved by consultant medical doctors. Feedback from experts and other knowledgeable individuals was gathered to determine the content validity. They were requesting their evaluation of the questionnaire and expert opinion on whether or not the questions adequately capture the intended construct or topic. Face validity was examined by the researchers and other experts evaluating the items. This process consisted of determining whether the queries appeared to measure what they were intended to measure. This process involved ensuring that the items are explicit, relevant, and suitable for the being assessed construct. They stated the questionnaire was easy to comprehend and complete. Furthermore, before the questionnaire was used on a wider scale, pilot research with a small group of participants was carried out to evaluate comprehension, and they confirmed that it was simple and clear.

The research ethics committee of the author's affiliated institution (HAPO-01-R-011, Ref: 197/2022) reviewed and approved the study, which follows the rules of the National Committee of Bio-Ethics. The data analyses were carried out using the statistical package for the social sciences, version 27 (SPSS, Armonk, NY: IBM Corp.). Descriptive statistics were used to present categorical variables such as frequency and percentage. Continuous variables were presented as mean (standard deviation/SD). The knowledge level about short stature was assessed using a continuous scale that was constructed based on participants' answers to 25- questions that

explored their knowledge about short stature (Table 2). Each correct answer was given a score of one, with a maximum attainable score of 25. The higher the score, the more knowledgeable the participant is. Independent sample t-test and ANOVA were used as appropriate to compare the mean knowledge score between different demographic groups. Binary logistic regression was conducted to identify factors that affect participants' knowledge about short stature. The dummy variable for the binary logistic regression utilized the mean knowledge score of the study participants (13.0) as the cut-off point. A p-value of  $0 < 0.05$  was set as the significant level.

**Results**

This study included a total of 6,852 individuals. The center area was home to nearly half (45.3%). More than half of the participants (65.4%) were between 18 and 30 years old. Females made up 54.7 % of the total participants. The average height of the participants in the study was 164.6 cm (10.2). More than half of the participants in the study (58.0%) reported they had a bachelor's degree. University students made up about 41.0 % of the study participants. Saudis made up the great majority of the participants (95.1%). Sixty-six percent of the study participants (60.6 %) were single.

Approximately half of the participants (55.0%)

**Table 1 Demographic Characteristics of Study Participants**

Demographic Variable	Frequency (%)
Area of residency	
Northern area	697 (10.2%)
Southern area	943 (13.8%)
Central area	3,101 (45.3%)
Eastern area	695 (10.1%)
Western area	1,416 (20.7%)
Age (years)	
18-30	4,483 (65.4%)
31-40	956 (14.0%)
41-50	859 (12.5%)
51 and over	554 (8.1%)
Gender	
Female	3,745 (54.7)%

**Table 1 (continued)**

Demographic Variable	Frequency (%)
How tall are you? (Mean (sd) cm)	164.6 (10.2)
Education level	
Preparatory	149 (2.2%)
Secondary	1,690 (24.7%)
Diploma	592 (8.6%)
Bachelor	3,976 (58.0%)
Postgraduate	445 (6.5%)
Employment status	
University student	2,835 (41.4%)
Unemployed	1,344 (19.6%)
Retired	392 (5.7%)
Working in the healthcare field	670 (9.8%)
Working outside the healthcare field	1,611 (23.5%)
Nationality	
Saudi	6,515 (95.1%)
Marital status	
Single	4,155 (60.6%)
Married	2,439 (35.6%)
Divorced	187 (2.7%)
Widowed	71 (1.0%)
Have heard about bone lengthening operations	(n=5,833)
Yes	3,207 (55.0%)
Know the types of modern lengthening operations	(n= 5,833)
Yes	1,397 (23.9%)
Source of information of modern lengthening operations	(n=1,391)
Social media	644 (46.3%)
A doctor or healthcare professional	340 (24.4%)
Friends and Relatives	277 (19.9%)
Other sources	130 (9.3%)

had heard of bone lengthening procedures. Around a quarter of the study participants (23.9%) were familiar with contemporary lengthening operations. The survey participants' primary source of information regarding the various types of contemporary

**Table 2 Perception About Height**

Frequency (%)	Variable
Find height in relation to others	
Short	1,176 (17.2%)
Average	4,532 (66.1%)
Long	1,144 (16.7%)
Opinion of optimal height	
150-155 cm	
156-160 cm	
161-165 cm	
166-170 cm	
171-175 cm	
176-180 cm	
181 cm and over	
Know that there is a way to treat the problem of short stature	
Yes	2,771 (40.4%)
Satisfied with current height	
No	1,542 (22.5%)
Yes	5,310 (77.5%)
Extra length that want to get (n=1,542)	
less than 5 cm	47.2%
5-7 cm	34.7%
7-8 cm	6.9%
8-10 cm	6.1%
more than 10 cm	5.2%
The height is a social or occupational obstacle (n= 6,704)	
Yes	704 (10.5%)

lengthening operations was social media. More than half of the study participants (66.1%) reported that they find their height about others as average. More than half of the study participants (61.8%) believed that the optimal height is 150-170 cm. Most research participants (77.5 %) expressed satisfaction with their height. Nearly half of those unhappy with their height (47.2 %) said they wanted to gain less than 5 cm. A total of 40.4% of survey participants stated that they are aware of a treatment option for their small height. Only one-tenth of the research participants (10.5 %) said their height is a social or occupational barrier.

With a mean score of 13.0 (SD 5.8) out of 25, the participants demonstrated moderate knowledge of short stature (52.0 %). When participants were asked about the causes of short stature, genetic factors were the most commonly mentioned (79.2 %). Short stature can occur due to complications during pregnancy, which is the least usually reported cause (13.7 %). Malnutrition related to food quality (70.9 %) and the frequency of daily meals (60.9 %) may contribute to a problem in children's growth, contributing to short stature, according to more than half of the survey participants. Child abuse and neglect are variables that may contribute to a problem in a child's development, which may contribute to short stature, according to less than half of the study participants (47.3 %). Long-term usage of cortisone treatments for children is one of the variables that may contribute to a problem in children's growth, which may contribute to short stature, according to more than half of the study participants (58.1%).

Obesity, short, and flat faces were the most generally reported signs, if they appeared, for which the participants believed they should visit a doctor because they may be related to the problem of short stature. Radiographs and lab tests help diagnose the problem of short stature in children, according to 54.1 % and 66.2 % of study participants. Most study participants (86.0 %) agreed that the treatment strategy for short height varies depending on the leading cause of short stature. Most survey participants (71.9%) thought that taking certain types of nutritional supplements as prescribed by a doctor was an effective treatment for varying reasons of short stature. Surgical operations are one of the methods used to cure the problem of short stature, according to a similar percentage (69.1%). Hormonal therapy is one of the strategies used to treat the problem of short stature, according to 83.2 % of study participants.

A total of 76.6% of the study participants identified that hormonal therapy is suitable only for children before puberty for treating short-stature problems. Around one-quarter of the study participants (23.7%) identified that for surgical management. Nutritional balance, doing sports, and sufficient sleep were accurately identified as recommended practices to avoid the problem of short stature in children by 63.6%, 63.5%, and 56.1%, respectively.

Most survey participants (78.0%) stated that if they have a problem with short stature or want to enhance their own or their children's

**Table 3 Knowledge About Short-Stature and Attitude Towards Treatment**

Variables	Frequency (%)
Knowledge about short stature	
Causes	
Reason for short stature (you can choose more than one answer)?	
Short stature for genetic reasons	5,424 (79.2%)
Idiopathic short stature	2,118 (30.9%)
Short stature due to endocrine disorders	1,793 (26.2%)
Short stature due to problems during pregnancy	942 (13.7%)
Malnutrition related to the quality of food is one of the factors that may contribute to a problem in the growth of children, which may contribute to short stature	(n=6,469)
Yes	4,589 (70.9%)
Malnutrition related to the number of daily meals is one of the factors that may contribute to a problem in the growth of children, which may contribute to short stature	(n=6,469)
Yes	3,938 (60.9%)
Child abuse and neglect are factors that may contribute to a problem in the development of children, which may contribute to short stature	(n= 6,469)
Yes	3,060 (47.3%)
The long-term use of cortisone treatments for children is one of the factors that may contribute to a problem in the growth of children, which may contribute to short stature	(n=6,469)
Yes	3,760 (58.1%)
Clinical symptoms	
It is known that there are many diseases whose occurrence is associated with short stature in children. Signs, if appeared, I believe that they need to consult a doctor because they may be related to the problem of short stature (You can choose more than one answer)	
Obesity (% Yes)	4,214 (61.5%)
Short neck (% Yes)	3,991 (58.2%)
Flat face (% Yes)	2,767 (40.4%)
Tongue protrusion (% Yes)	2,642 (38.6%)
Small ears (% Yes)	2,431 (35.5%)
Face Rotation (% Yes)	2,051 (29.9%)
Methods of diagnosing the disease	
Diagnostic methods effective in diagnosing the problem of short stature in children (You can choose more than one answer)	
Radiograph (% Yes)	4,534 (66.2%)
Lab tests (% Yes)	3,705 (54.1%)
Methods of Treatment	
The method of treatment for the problem of short stature differs according to the main cause of short stature	(n=5,916)
Yes	5,090 (86.0%)

**Table 3 (continued)**

Variables	Frequency (%)
The use of some types of nutritional supplements - prescribed by the doctor -an effective treatment for some causes of the problem of short stature	
Yes	4,256 (71.9%)
Surgical operations is one of the methods used to treat the problem of short stature	(n=5,916)
Yes	4,088 (69.1%)
Hormonal therapy one of the methods used to treat the problem of short stature	(n=5,916)
Yes	4,920 (83.2%)
The following methods for treating the problem of short stature is suitable only for children before puberty	
Hormonal therapy	5,247 (76.6%)
Surgical management	1,624 (23.7%)
The following is recommended to avoid the problem of short stature in children (You can choose more than o\ answer)	
Nutritional balance	4,361 (63.6%)
Doing sports	4,349 (63.5%)
Proper sleep	3,844 (56.1%)
Attitudes	
I am ready to consult a doctor if I suffer from a problem of short stature or want to increase my height or the height of your children	(n=5,841)
Yes	4,556 (78.0%)
I am ready to give hormonal therapy to my children if they suffer from short stature problem to increase their height under medical supervision.	(n=5,841)
No	665 (11.4%)
Yes	2,357 (40.4%)
I don't have children	2,819 (48.3%)
I am ready to do surgical intervention if I suffer from a problem of short stature by lengthening the bones or want to increase my height.	(n=5,841)
Yes	2,484 (42.5%)
I am ready to have an operation or get treatment to get the height and stature I am looking forward to for me and my children	(n=5,820)
Yes	2,760 (47.4%)
Reasons for not agreeing to do operation or get treatment, you can choose more than one answer (n=4,092)	
Duration of treatment	1,501 (36.7%)
The cost	1,350 (33.0%)
The presence of an external device is annoying	1,339 (32.7%)
The work	763 (18.6%)
Embarrassment from family and relatives	436 (10.7%)
If an internal device is available that solves the problem of short stature with a higher cost for it, I am ready to perform the operation for me or my children	(n=5,769)
Yes	2,847 (49.3%)

**Table 4 Knowledge Score Stratified by Demographic Characteristics**

Demographic Variable	Mean Knowledge Score (SD)	P-value
Area of residency		
Northern area	13.8 (5.9)	≤0.001**
Southern area	13.3 (6.1)	
Central area	12.8 (5.8)	
Eastern area	13.7 (5.9)	
Western area	12.9 (5.4)	
Age (years)		
18–30	13.5 (5.9)	≤0.001**
31–40	12.6 (5.6)	
41–50	12.5 (5.2)	
51 and over	11.4 (5.8)	
Gender		
Male	13.3 (5.9)	0.013*
Female	12.9 (5.7)	
Education level		
Preparatory	10.2 (6.2)	≤0.001**
Secondary	12.6 (5.9)	
Diploma	12.0 (5.6)	
Bachelors	13.5 (5.7)	
Postgraduate	13.4 (5.7)	
Employment status		
University student	14.0 (5.9)	≤0.001**
Unemployed	11.5 (5.5)	
Retired	11.5 (6.0)	
Working in the healthcare field	15.3 (5.6)	
Working outside the healthcare field	12.2 (5.3)	
Nationality		
Non-Saudi	11.9 (5.6)	≤0.001**
Saudi	13.2 (5.8)	
Marital status		
Single	13.7 (5.8)	≤0.001**
Married	12.2 (5.7)	
Divorced	13.1 (5.6)	
Widowed	12.7 (5.3)	

\*p≤0.05; \*\*p≤0.001

height, they are willing to consult a doctor. Only 40.4% of research participants said they would give their children hormone therapy for short stature management under medical supervision if it proved to be a successful treatment for their condition. A similar amount (42.5%)

of survey participants stated that they are willing to undergo surgical intervention - bone lengthening - if it is an effective way of managing short stature or if they desire to raise their own or their children's height. A total of 47.4 % of study participants said they are willing to have

**Table 5 Factors Affecting Participants' Knowledge Identified by Binary Logistic Regression**

Demographic Variable	Odds Ratio of Being Knowledgeable	95% Confidence Interval
Central area (Reference group)	1.00	
Southern area	1.07	(0.94–1.23)
Northern area	1.25	(1.07–1.47)**
Eastern area	1.21	(1.03–1.42)*
Western area	0.98	(0.90–1.12)
Age (years)		
18–30 (Reference group)	1.00	
31–40	0.81	(0.71–0.93)**
41–50	0.87	(0.76–1.00)*
51 and over	0.64	(0.54–0.76)***
Gender		
Female (Reference group)	1.00	
Male	1.01	(0.92–1.12)
Education level		
Preparatory (Reference group)	1.00	
Secondary	0.92	(0.83–1.02)
Diploma	0.70	(0.59–0.82)***
Bachelor	1.19	(1.10–1.28)***
Postgraduate	1.10	(0.91–1.34)
Employment status		
University student (Reference group)	1.00	
Unemployed	0.64	(0.57–0.71)***
Retired	0.64	(0.52–0.78)***
Working in the healthcare field	1.82	(1.53–2.16)***
Working outside the healthcare field	0.73	0.66–0.81)***
Nationality		
Saudi (Reference group)	1.00	
Non-Saudi	0.74	(0.60–0.92)**
Marital status		
Single (Reference group)	1.00	
Married	0.73	(0.66–0.79)***
Divorced	1.09	(0.81–1.46)
Widowed	0.74	(0.46–1.18)

\*p≤0.05; \*\*p≤0.01; \*\*\*p≤0.001

an operation or receive treatment to achieve the height and stature they desire for themselves or their children. With 36.7 %, 33.0 %, and 32.7 %, respectively, the most commonly reported barriers that prevented participants from being ready to perform surgery or receive treatment

for short-stature problems were the length of treatment, the cost, and the intrusive presence of an external device. On the other hand, nearly half of the study participants (49.3%) said they would be willing to operate for themselves or their children if an internal device that solves the



problem of short stature at a higher cost became available.

Participants' knowledge scores about short stature differed significantly based on their area of residency, age, education level, employment status, nationality, and marital status ( $p \leq 0.05$ ). Participants who were living in the northern and eastern area, aged 18–30 years, males, those with higher education (bachelor's degree or postgraduate), those who are working in the healthcare sector, Saudis, and single showed higher knowledge scores compared to others (Table 4).

Binary logistic regression confirmed that participants who are living in the northern and eastern areas, those who have bachelor's degrees, and those who are working in the healthcare field are more likely to be knowledgeable about short stature compared to others ( $p \leq 0.01$ ) (Table 5).

## Discussion

This study aimed to explore the knowledge about SS and attitudes towards its treatment among the general public in Saudi Arabia. The key findings of our research are: 1) around half of the study participants reported that they have heard about bone lengthening operations and around one-quarter the study participants reported that they know the types of modern lengthening operations, 2) social media was the main source of information of the study participants about the types of modern lengthening operations, 3) a total of 40.4% of the study participants reported that they know that there is a way to treat the problem of short stature, 4) the participants showed a moderate level of knowledge about short stature with the vast majority of the study participants identified that the method of treatment for the problem of short stature differs according to the main cause of short stature, 5) the majority of the study participants reported that if they suffer from a problem of short stature or want to increase their height or the height of their children, they are ready to consult a doctor regarding this problem, and only 40.4% of the study participants reported that they are ready to give their children hormonal therapy for the management of short stature under medical supervision if it was effective treatment for their condition, 6) a total of 47.4% of the study participants reported that they are ready to have an operation or get treatment to get the height and stature they are looking forward to for them or their children, 7) duration of treatment the cost,

and the annoying presence of an external device were the most commonly reported barriers that prevented the participants from being ready to perform operation or get treatment for short stature problems.

Short stature can be subcategorized into familial, non-familial idiopathic short stature, and pubertal delay. Further sub classification can be according to short stature secondary to a small birth size (small for gestational age/ SGA) and systemic and endocrine diseases.<sup>8</sup> In this paper, participants showed a moderate level of knowledge about short stature with a mean score of 13.0 (SD 5.8) out of 25 (52.0%). Participants living in the northern and eastern areas, those with a bachelor's degree, and those working in the healthcare field are more likely to be knowledgeable about short stature than others ( $p \leq 0.01$ ). Regarding the causes (79.2%) believed that short stature is linked to genetic or familial factors; this goes coherent with previous study that showed that the most common cause of SS was familial/genetic.<sup>2</sup> On the contrary, a study was done in China showing the primary cause of SS was idiopathic and endocrinal, while genetic causes were the least observed in this case.<sup>9</sup> However, the commonest cause of SS remains unclear as it varies and differs in each country. Regarding the impact of SS on individual life, our study showed that (22.5%) of participants are not satisfied with their height and would like to grow taller; this type of feeling can be linked to what was described in previous literature. A condition known as Height dysphoria or neurosis is a type of body image anxiety disorder in which the patient is unsatisfied or distressed because they perceive themselves as short.<sup>10</sup> Our study also showed that (10.5%) of participants reported that their height is a social or occupational obstacle. The correlation between height and life satisfaction was established in previous literature; the taller a person is, the more satisfied. Adults with short statures may experience unpleasant consequences throughout their lives. There are some evidence suggesting that the short-statured children and adults are socially and economically disadvantaged and their quality of life is also effected in compared to those with normal stature.<sup>11</sup> This obstacle of SS can be overcome with the modern development of medicine. There are various ways to treat SS, for instance, cosmetic or corrective lengthening surgeries or hormone replacements, and even physiotherapy.<sup>2</sup> Regarding knowledge of treatment methods, the vast majority of the study participants (86.0%) identified that the

treatment method for SS differs according to the leading cause. As for willingness, most of the study participants (78.0%) reported that if they suffer from a short stature problem or want to increase their height or their children's height, they are ready to consult a doctor regarding this problem. Furthermore, only 40.4% of the study participants reported that they would give their children hormonal therapy to manage short stature under medical supervision if it was an effective treatment. While 47.4% of the study participants reported that they are ready to have an operation or get treatment to get the height and stature they look forward to for themselves or their children. Duration of treatment, the cost, and the burden of the presence of an external device were the most commonly reported barriers that prevented the participants from being ready to perform the operation or get treatment for short stature problems with 36.7%, 33.0%, and 32.7%, respectively. Children with short stature might get distinctly diverse recommendations with varying levels of complexity and expense, as well as recommendations whose relative risks and benefits are unclear. Growing taller and reducing psychosocial disability while keeping positive risk/benefit and cost/benefit ratios are two justifications for treating childhood short stature.<sup>12</sup> Human-growth hormone-based hormone therapy for SS is pricey and costs rise as treatments are given for longer and at higher doses.<sup>13</sup> Low-dose androgen therapy using either injectable testosterone or oral oxandrolone (e.g. 1.25–2.5 mg/day) is one of the non-hGH growth-promoting treatments for short peri-pubertal boys. Although neither is FDA-approved for growth acceleration, both have been shown in controlled studies to accelerate growth by 3–5 cm/year for 1–3 years.

Short-statured children and adolescents have more internalizing issues and suffer from height-related quality of life deficits, which adds to caregiver stress and lowers parents' quality of life.<sup>14</sup> Due to their condition, short-statured children experience severe social, academic, and psychological challenges.<sup>5</sup> These include stigmatization and discrimination, low self-esteem, body image issues, a lack of developmentally appropriate social skills, and social withdrawal, increasing the parents' responsibilities and concerns. Multidisciplinary interventions in the context of pediatric short stature should focus on the children's or adolescents' psychosocial functioning in addition to growth hormone therapy. They should also give the parents cognitive and behavioral

management techniques to deal with their child's physical, emotional, social, and behavioral issues.<sup>14</sup> In order to improve the results of family-centered psychosocial therapies aiming at fostering parents' adaptation, caregiving stress should be consistently assessed and chosen as a strategic intervention target.

The nature of the cross-sectional survey design is itself causing a limitation as it limits the ability to identify causality between study variables. Furthermore, more studies are needed to assess knowledge about SS and attitudes toward its treatment among the general public using similar survey tools; different studies used different tools to explore participants' knowledge, which limited our ability to compare our findings. In this study, we employed a quantitative methodology with pre-set responses, which might not have allowed participants' views to provide varied but valuable qualitative information. As a result, our findings must be interpreted carefully.

In conclusion, Saudi Arabians have a moderate understanding of SS, which needs to be improved. Campaigns to increase the general public's and parents' knowledge about SS, which is ultimately connected to earlier diagnosis and better management outcomes. Additional research is required to examine the most effective strategies for raising public knowledge of SS.

## References

1. Rani D, Shrestha R, Kanchan T, Krishan K. Short Stature. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2023.
2. Yadav S, Dabas A. Approach to short stature. *Indian J Pediatr.* 2015;82(5):462–70.
3. Velayutham K, Selvan SSA, Jeyabalaji RV, Balaji S. Prevalence and etiological profile of short stature among school children in a South Indian Population. *Indian J Endocrinol Metabolism.* 2017;21(6):820–2.
4. El-Shafie AM, Kasemy ZA, Omar ZA, Alkalash SH, Salama AA, Mahrous KS, et al. Prevalence of short stature and malnutrition among Egyptian primary school children and their coexistence with Anemia. *Italian J Pediatrics.* 2020;46(1):1–9.
5. Backeljauw P, Cappa M, Kiess W, Law L, Cookson C, Sert C, et al. Impact of short stature on quality of life: a systematic literature review. *Growth Horm IGF Res.* 2021;57–58:101392.
6. Alsafadi D, Ezzat A, Altamimi F, ElBagoury M, Olfat M, Saleh M, et al. Mucopolysaccharidosis

- type I disease prevalence among patients with idiopathic short stature in Saudi Arabia: protocol for a multicenter cross-sectional study. *JMIR Res Protoc.* 2021;10(8):e28619.
7. El Mouzan M, Alahmadi N, ALSaleem KA, Assiri A, AlSaleem B, Al Sarkhy A. Prevalence of nutritional disorders in Saudi children with inflammatory bowel disease based on the national growth reference. *Arab J Gastroenterol.* 2020;21(3):179–82.
  8. Cutfield WS, Albert BB. Growth Hormone Treatment for Idiopathic Short Stature. *Pediatr Endocrinol Rev.* 2018;16(Suppl 1):113–22.
  9. Chen WW, Liu HX, Liu J, Yang LL, Liu M, Ma HJ. [Etiology and genetic diagnosis of short stature in children] *Zhongguo Dang Dai Er Ke Za Zhi.* 2019;21(4):381–6.
  10. Wyshak G. Height, socioeconomic and subjective well-being factors among U.S. women, ages 49-79. *PLoS One.* 2014;9(6):e96061. doi:10.1371/journal.pone.0096061
  11. Backeljauw P, Cappa M, Kiess W, Law L, Cookson C, Sert C, et al. Impact of short stature on quality of life: a systematic literature review. *Growth Horm IGF Res.* 2021;57–58:101392. doi:10.1016/j.ghir.2021.101392
  12. Allen DB, Cuttler L. Clinical practice. Short stature in childhood—challenges and choices. *N Engl J Med.* 2013;368(13):1220–8.
  13. Allen DB. Cost-conscious growth-promoting treatment: when discretion is the better part of value. *Horm Res Paediatr* 2018;90:145–150.
  14. Silva N, Bullinger M, Sommer R, Rohenkohl A, Witt S, Quitmann J. Children’s psychosocial functioning and parents’ quality of life in paediatric short stature: the mediating role of caregiving stress. *Clin Psychol Psychother.* 2018;25(1):e107–18.