

Maqbul MS, Basalib SG, Almutairi AK, Sarhan RN, Bakhsh LM, Alharbi MA, Alotaibi SD. A study on the prevalence of Vitamin D deficiency in sickle cell disease amongst pediatric population in Kingdom of Saudi Arabia. *Medical Science* 2022; 26: ms549e2671.
doi: <https://doi.org/10.54905/disssi/v26i130/ms549e2671>

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Peer-Review History

Received: 06 December 2022

Reviewed & Revised: 08/December/2022 to 19/December/2022

Accepted: 20 December 2022

Published: 21 December 2022

Peer-review Method

External peer-review was done through double-blind method.

URL: <https://www.discoveryjournals.org/medicalscience>



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A study on the prevalence of Vitamin D deficiency in sickle cell disease amongst pediatric population in Kingdom of Saudi Arabia

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ABSTRACT

The important recognition of this examines changed into to research the position of Vitamin D in correlation with pediatric SCD in Saudi Arabia. Vitamin D deficiency is not unusual place in every age and nations and is in particular related to SCD in kids. Vit D supplementation reduces the chance of SCD in kids and kids however has little impact on innate immunity after publicity to contamination and at different concentrations together. The examiners used online survey questionnaires and randomly disbursed them thru social media platforms. The online pattern length calculator Raosoft (Raosoft Inc., Seattle, WA, USA) anticipated pattern sizes. Social science statistical package model 22.0 (IBM SPSS, IBM Corp., Armonk NY, USA) to carry out descriptive statistics, Shapiro-Wilk's take a look at evaluates the ordinary distribution of data. The effects received were calculated for Pearson Chi Square for importance and are truly tabulated and proven with inside the figures for every person end result type. The effects received had been categorized in one of kind sections for the specific dialogue of the reaction fee with that of P-Value esteem importance. This examines pursuits to observe the position of Vit D withinside the combat towards SCD and public belief of it with the in a position fitness government to nicely combat its effects.

Keywords: Vitamin D, Sickle Cell Disease, Sickle Cell Anemia, Saudi Arabia, Pediatric, Prevalence, Deficiency, P-Value, Pearson

1. INTRODUCTION

Vitamin D exerts pleiotropic effects well beyond its classical role in mineral homeostasis. Tissue activity requires two enzymatic conversions to 25-hydroxy Vit D and 1; 25-dihydroxy Vit D. Vit D has since been shown to

modulate immune responses (Zhu et al., 2005). Vit D deficiency is common in all age groups and in all countries, a fact of particular concern when it comes to childhood sickle cell disease (Wild et al., 2001). Vit D supplementation reduces the risk of SCD in children and adolescents (Osunkwo et al., 2012) but has limited effects on innate immunity after exposure to various infectious diseases (Sil et al., 2016). Also, the various concentrations used do not inhibit proinflammatory or proinflammatory responses (Almeida et al., 2001).

A cross-sectional study in the United Kingdom (UK) showed a linear relationship between adequate Vit D in take and a reduced risk of SCD in children (Brandow et al., 2020; Jonassaint et al., 2016). Vit D deficiency has been repeatedly associated with increased disease severity, but a causal link between Vit D deficiency and multiple organ failure could not be proven (Dampier et al., 2017; Darbari et al., 2015). Therefore, the efficacy of Vit D as a therapeutic agent for critically ill patients remains controversial (Chou et al., 2015). This study analyzed the clinical and immunological effects of Vit D deficiency, Vit D supplementation and Vit D supplementation in pediatric patients with sickle cell anemia who later developed other health complications (Brousseau et al., 2010). He also focused on analyzing the need for Vit D, as the main source of Vit D in both children and adults is moderate sun exposure (Treadwell et al., 2015). Both children and adults need 1000 IU of cholecalciferol per day (Alhosani et al., 2005).

Vit D deficiency interferes with the mineralization of the bone collagen matrix in young children, causing growth retardation and bone deformity (Faulstich et al., 1986; Nobrega et al., 2018). It can also cause muscle weakness and increase the risk of falls and fractures. SCA is a congenital blood disorder in children and is inherited from parents to a child (Auttiramo et al., 2005; Kadkhodaei et al., 1998). Many complications of SCD can be exacerbated by Vit D deficiency in Saudis (Laurence et al., 2006).

We are conducting a cross-sectional study focused on identifying possible short and long-term complications of Vit D in children with sickle cell disease (Piel et al., 2013). The most affected people were hospitalized to determine the most common symptoms and their impact on the population (Perlin et al., 1994). In this study, these complications were life-threatening (Payne et al., 2020). We also conducted an analysis that it might be a knowledge analysis of awareness and preventive behavior in the community.

2. MATERIAL AND METHOD

Study design

A retrospective online cross-sectional study of parents of a cohort of children susceptible to complications of SCD due to Vit D deficiency in Saudi Arabia. Data collection took place from August 13, 2022 to November 12, 2022. This study used a self-administered online survey that was conducted online and randomly distributed to residents via a social networking platform (Muazzam et al., 2021). This study used a self-administered questionnaire. Potential participants were provided with a website with a brief summary of the study objectives and guidelines for conducting the study (Maqbul et al., 2022).

A Study on the prevalence of Vitamin D Deficiency in Sickle Cell Disease amongst pediatric population in Kingdom of Saudi Arabia received IRB ethical approval from the institution's Human Ethics Committee IRRB -02-0111-2022 from the Ibn Sina National College Research Evaluation Card Protocol ID 004MP14102022. Informed consent was obtained from each respondent by obtaining a blanket general invitation containing a link to the survey and a statement that participation was voluntary and all responses were anonymous. Clicking on the link will take you to a Google form. There, all questions must be answered in order to proceed to the next part of the survey and there was no possibility of missing data of the 1354 surveys received from respondents, 914 participants enrolled in this survey. This study included children of participants who were prone to SCA due to Vit D deficiency. Those who were less likely to develop SCD due to adequate Vit D intake were excluded (Muazzam et al., 2022).

Research and data collection

The first part contains questions on demographic and clinical characteristics such as place of residence, gender, age, nationality, education, chronic co-morbidities and previous infections due to Vit D deficiency (Levenson et al., 2008) the second part contains questions about the type of Vit D deficiency and frequency of administration. Next, questions about minor and severe side effects i. H. Minor side effects such as mild fever, chills, diarrhoea and headache, injection site pain, redness, pain or itching, muscle aches, fatigue and weakness (Kroenke et al., 2001). The reliability of the survey was assessed using an internal consistency test known as Cronbach's alpha (Muazzam et al., 2022).

Sample size

Sample sizes were calculated using the online sample size calculator from Raosoft (Raosoft Inc., Seattle, WA, USA). It assumes a 95% confidence level, 3% error bars and a 50% response distribution. The recommended sample size is 1354. The study included 914 participants who completed a questionnaire based on inclusion and exclusion criteria (Muazzam et al., 2021).

Statistical analysis

Statistics Package for Social Sciences version 22.0 (IBM SPSS, IBM Corp., Armonk, N.Y., USA) for performing descriptive statistics. Shapiro-Wilk test to assess normality of data. Data are presented as the mean and standard deviation (SD) (minimum and maximum) of the parameter data according to the frequency and percentage of the classified data. In Pearson's chi-squared study, the data and the importance of his Kruskal-Wallis study on the occurrence of adverse reactions to vaccination were ranked on his 1-to-1 scale by general health 10 because the data are not normally distributed (Maqbul et al., 2021).

3. RESULT AND DISCUSSION

This study's target sample collection population was 914 participants according to inclusion and exclusion criteria from the 1,354 responses received to complete the survey. For a better understanding of the study description, the collected data are summarized in detail in Table 1. This categorizes the corresponding responses and presents them in a well-prepared format for descriptive analysis with values. P-values (<) were determined by Pearson's test of chi-square significance for each question type, with <0.5 considered a significant value (Maqbul et al., 2022). Responses were divided into separate sections and the significance of the P-value for each section was carefully analyzed and tabulated in Table 1 along with the proportion of response rates. A separate historical figure was created for each category.

Table 1 Response rate (%) with p-value esteem (<)

Survey-Questionnaires	Response Rate (%)	P-Value Esteem (<)
Region		0.04
Central	24	
Eastern	35	
Western	22	
Southern	19	
Northern	09	
Pediatric Age		0.05
0-2	37	
2-5	25	
5-9	17	
9-12	11	
12-16	10	
Gender		0.03
Male	11	
Female	99	
Nationality		0.03
Saudi	73	
Non Saudi	27	
Language		0.03
Arabic	88	
English	12	
Qualification		0.09
Graduate	30	
Post Graduate	11	
School	22	

Others	37	
Do you have any family members that have Vit D deficiency?		0.01
Yes	53	
No	41	
Not Sure	6	
Did your child apply sunscreen?		0.05
Yes	25	
No	47	
Not Sure	28	
If yes how many times per week?		0.01
0-7	45	
7-14	38	
14-21	17	
How much sun exposure did your child had in the past week on average minutes per day?		0.02
<5	51	
5-15	24	
15-30	16	
>30	9	
How many servings of milk did your child get daily?		0.04
<3	19	
3	69	
>3	10	
None	2	
Did your child take multiVit supplements?		0.04
Yes	43	
No	57	
Not Sure	0	
Do you have any person taking Vit D therapy in your family?		0.05
Yes	12	
No	77	
Not Sure	11	
Do your children take Vit D supplements?		0.06
Yes	59	
No	41	
Not Sure	0	
Do your children feel fatigue most of time?		0.07
Yes	27	
No	55	
Not Sure	18	
Do you notice any changes in your child's energy?		0.03

Yes	41	
No	53	
Not Sure	7	
Do you notice any changes in your child's mood?		0.06
Yes	33	
No	67	
Not Sure	0	
Did your child suffer of any bone's pain?		0.03
Yes	21	
No	57	
Not Sure	22	
Did your child suffer of hair loss?		0.04
Yes	10	
No	89	
Not Sure	1	
How many average hours per day did your child sleep last month?		0.03
<5	19	
5	36	
5 to 8	41	
>8	14	
How many calories did your child gain in last 6 months?		0.05
<2	37	
2 to 5	26	
>5	5	
None	32	
How do you rate the general well-being of your child's health in the scale of 1 to 10		0.38
1	3	
2	5	
3	2	
4	3	
5	17	
6	1	
7	19	
8	9	
9	22	
10	15	

Socio-demographic data

The survey was conducted among the urban population of the Kingdom of Saudi Arabia region, with a distribution of participants from the center - 24%, from the east - 35%, from the west - 22%, from the south - 19%, from the north - 09%. The number of symbolic responses represented by the P estimator obtained with the Pearson chi-square test is 0.04 (Figure 1).

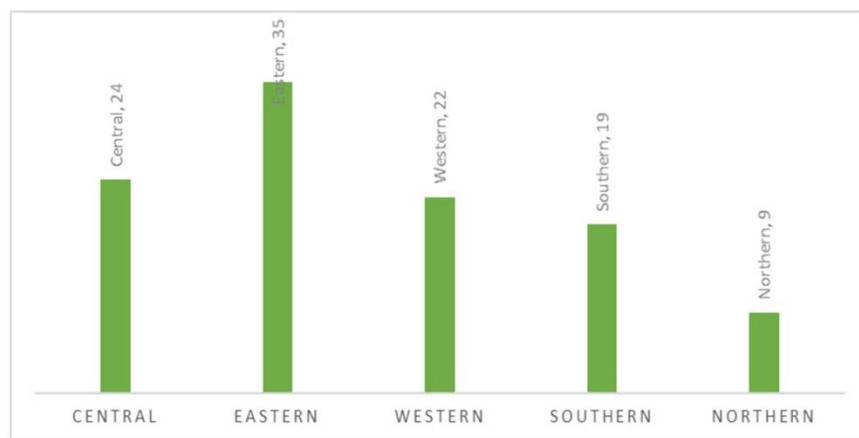


Figure 1 Demographic distribution

Biographical data summary survey questions were based on race, child age groups by age, gender and qualified accent and were presented as a volunteer plan. The Pearson Chi-Square survey found that the majority of participants were Saudi nationals, with 73% and 19% respectively non-Saudi nationals. The estimated difference P was 0.03. In the 0-2 year old age group, 37% of parents participated in the complex child group. 25% are 2-5 years old, 17% are 5-9 years old, 11% are 9-12 years old and 10% are 12-16 years old. The significant difference obtained according to the P-estimate obtained by Pearson's test for chi-square significance was 0.005. Regarding sex transport, approximately 89% of the participants were female and 11% were male, with a P-estimate of 0.03 for Pearson's chi-square significance test. Based on the language of the participants, the P values obtained using the Pearson chi-square test were significantly different, 0.03, with 88% being Arabic speakers and only 12% being English speakers was the parents' educational level in the study indicated that the majority of parents (37%) belonged to another group. With 30% graduates, 11% graduate students and 22% grade level, the P-estimate of the Pearson test for chi-square significance is 0.09 (Figure 2).

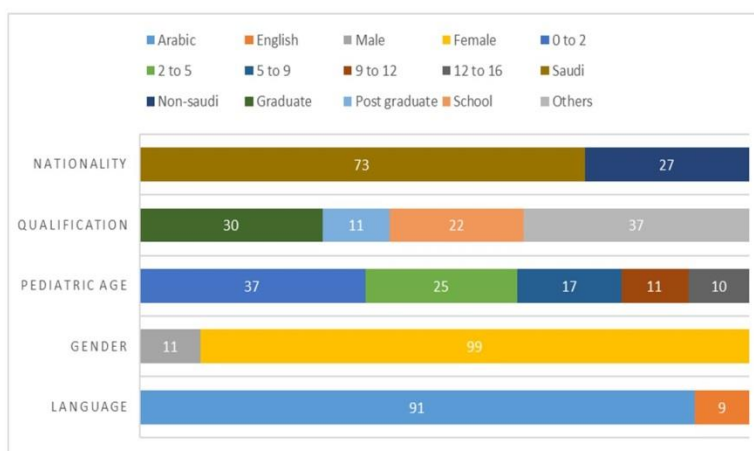


Figure 2 Social information

Diagnostic questionnaire

The placement of the public questionnaire, based on a 'yes' or 'no' poll on complications caused by sickle cell anemia, was well crafted and presented as a summary based on the volume of responses received. About the questionnaire "Is anyone in your family Vit D deficient? % and Pearson's chi-square test. Are you there?" P-value was 0.05safeties. 12% answered yes, 49% said no and 39% said 'don't know' to the question 'Does anyone in your family have SCA?' using Pearson's chi-square test there was a large difference of 0.03 in the p-estimate obtained. The next survey in this category, "Has your child taken a multiVit?" P estimation the following grading studies were conducted. 41% answered "Does your child take a Vit D supplement?" and 0% answered "I don't know". The survey revealed a significant difference of 0.05 P-estimate, with 25% yes, 47% no and 28% unknown for the next questionnaire, "Is your child always tired?" (Figure 3).

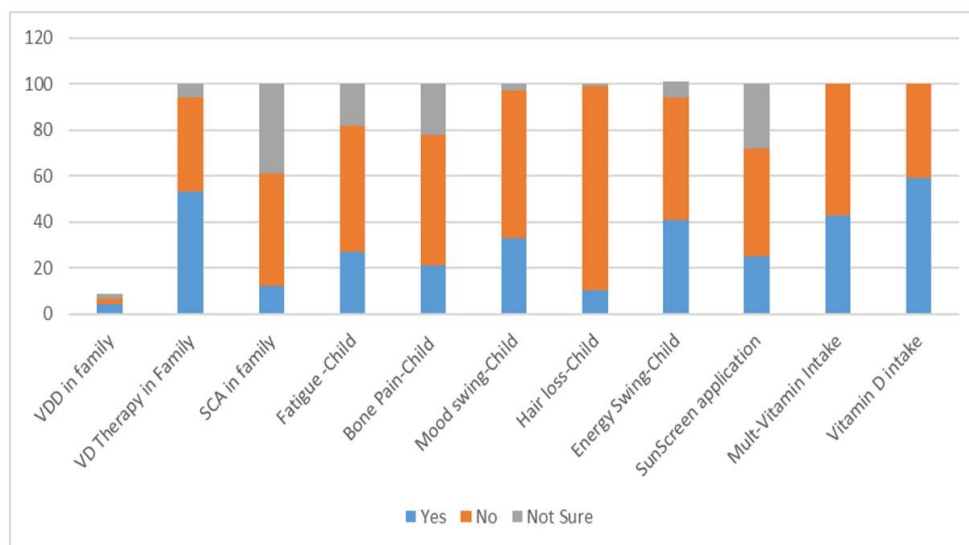


Figure 3 Diagnostic questionnaires

Patency

A series of planned survey-questionnaires were devised in this category related to life style routine patency of the child in correlation with Vit D and sickle cell disease and the level of the outcomes was depicted. The proposed questionnaire to the target population regarding, "How many times per week your child applies sunscreen?" The response for heart palpitation was 45% for 0 to 7 times per week, 38% for 7 to 14 and there was 17% response for 14 to 21, with the P-esteem obtained by using the Pearson's test for significance of Chi-square being 0.01, indicating a significant difference. The following survey was directed at the target population in terms of "How much sun exposure did your child have in the past week on average minutes per day?" Where 51% of those polled responded positively to the <5>30 minutes per day respectively with the P-esteem obtained by using the Pearson's test for significance of Chi-square was 0.02 which was a significant difference. The nest survey questionnaire was directed at the target population in terms of "How many servings of milk did your child get daily?" >3 option received only 10% and the option none received 2% respectively with the P-esteem obtained using the Pearson's test for the significance of Chi-square being 0.04, indicating a minor difference. The next questionnaire in this category was "How many average hours per day did your child sleep last month?" Which a critical 19% answered <5 to 8 hours? with a significant difference in P-esteem obtained by using the Pearson's test for significance of Chi-square for the poll was 0.03. The last survey in this category was about "Does your child suffer from hair loss?" His p-value difference, determined by Pearson's test for the chi-square significance of the survey was 0.04 and the majority of participants said he was 89% no and 11% yes answered, 0 people answered, "I don't know" I don't know" in %. The final question of this research class was specifically strategically related to SCD prevention and Vit D awareness, said <2 dressed quite 37 against 5. He had a large difference in P-estimate compared to case. Pearson's test for the significance of the chi-square values obtained in this study is his 0.05 (Figure 4).

Well Being

The final questionnaire of this cross-sectional study was designed specifically to examine the effects of Vit D-related SCD on children's health and responses were analyzed using a health status score ranging from 1 to 10. I was finished. This question was specifically asked at the end of the cross-sectional survey. "How would you rate your child's general condition?" Most of the 22 volunteers achieved an impact rate of 9. However, impact rates of 5, 7 and 10 were 17 and 19, respectively and received a moderate percentage of responses of 15%. On the other hand, the other response rates for 1, 2, 3, 4, 8 and 6 received smaller percentage responses of 3, 5, 2, 3 and 1%, respectively and the questionnaire categories were Pearson's Chi 0.38 using the squared test importance (Figure 5).

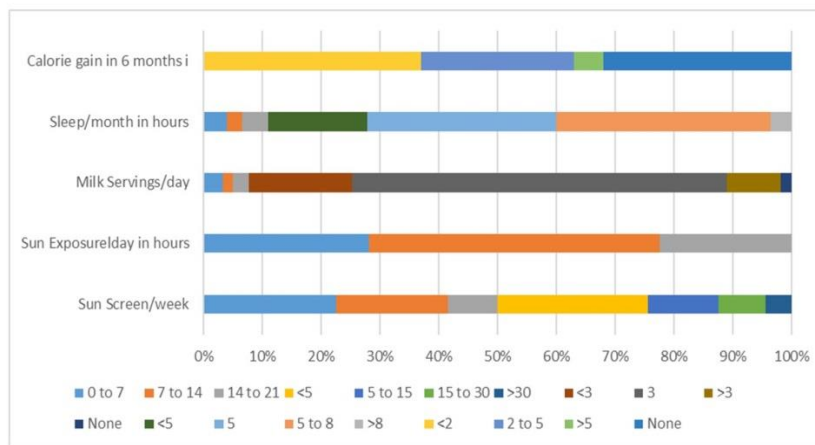


Figure 4 Patency

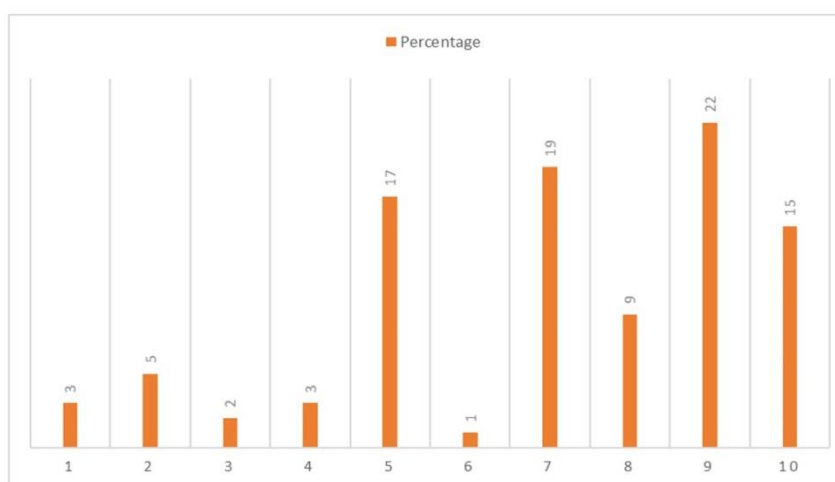


Figure 5 Well-being scale of child

Although specific data are lacking, Vit D deficiency is associated with a high prevalence of sickle cell disease (Smith et al., 2008). A large population based on KSA cohort study did not report altered Vit D status as a modifiable risk factor for sickle cell anemia (Lubega et al., 2018). In our studies, the majority of children with life-threatening SCD were Vit D deficient (Sheriff et al., 2022). These results indicate a very high prevalence of Vit D.

4. CONCLUSION

This multi-level review is dedicated to answering well-phrased survey questions on headaches due to dietary D deficiency in children in city dwellers in the Kingdom of Saudi Arabia susceptible to sickle cell disease. We received great, high-quality feedback from our target audience. Cumulative events are categorized very broadly and described separately. A good score for self-esteem P is obtained by betting on the chi-square significance test in all surveys that Pearson conducts in its test evaluation studies. This first-hand assessment is of great interest and all this is to study neighboring intellectual factors to support the great efforts of experts articulating the most enlightening truths. Additional research is needed. This review has become work related to major critical tests in preventive medicine. Therefore, this review recommends that the well-known and complete record of dietary occurrences of her D deficiency in the neighborhood is consistent with the prevalence of a subset of sickle cell disease-prone children doing. The government's response to the general public was found to be exemplary.

Acknowledgement

The authors are very thankful to the administration of Ibn Sina National College, Jeddah, KSA, for giving us constant encouragement, support and guidance.

Ethical Approval

This research study was approved by the Institutional Human Ethics Committee with ethical approval IRRB-02-0111-2022 of the Ibn Sina National College Research Review Board with Protocol identification number 004MP14102022.

Author contributions

All authors have made equal contributions to the work and approved it for publication. MSM: Conception, literature search, design, supervision and organized the work and final approval. AKA: Conception and design of the work, revisions and final approval. RNS: Writing, critical review of the final draft and final approval. SGB: Investigation, conceptualization, methodology, wrote the original draft of the manuscript. LMB: Conceptualization, methodology, co-wrote and organized the original draft of the manuscript. MAA & SDA: Methodology, writing, reviewing, aligning and editing. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

Abbreviation

Vitamin (Vit), Sickle Cell Disease (SCD), Sickle Cell Anemia (SCA)

Funding

This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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