SJIF Impact Factor: 6.711

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 9.
Issue: 5
Page N. 275-280
Year: 2025

Original Article www.wjahr.com

RISK FACTORS FOR STUNTING AMONG LESS THAN FIVE CHILDREN IN MOSUL CITY-IRAQ

Saad Hussein Hammo[1]*, Zubair Aziz Gerdo[2] and Zakarea Ibrahim Ismael Sheet[3]

[1]M.B.Ch.B/F.A.B.H.S (Ped.), Mosul General Hospital.
[2]M.B.Ch.B./F.I.B.M.S (Ped.), Talafar General Hospital.
[3]M.B.Ch.B./F.A.B.H.S (Ped.). Al Wafa'a Endocrine specialized Center.

Article Received date: 15 March 2025 **Article Revised date:** 05 April 2025 **Article Accepted date:** 25 April 2025

***Corresponding Author: Saad Hussein Hammo**
M.B.Ch.B/F.A.B.H.S (Ped.), Mosul General Hospital.

ABSTRACT

Background: Stunting, caused by persistent malnutrition, it is a major global issue that hinders human growth. Stunted children are defined as having a height-for-age z-score that is less than two standard deviations below the WHO Child Growth Standards median for children of the same age and sex. **Objectives:** Is to assess the risk factors of stunting among children aged less than five in Mosul City -Iraq. **Methods:** The study is a descriptive, case control study. It was conducted between the 11th of September 2023 to the end of March 2025 at Mosul General Hospital, Talafar General hospital and Al Wafa'a Endocrine specialized center in Mosul. The questionnaire was divided into three parts. The first section provides demographic information about the study participants, including their age, gender and residence. The second section for the presence of supplemental feeding and child's access to health facility. The third part for mother's educational level, and family's socio-economic state. **Results**: The study included 400 patients, of them 128 patients with stunting (cases) and 272 patients with normal weight (controls) and presented for other causes. Moreover; 207 (51.75%) patients are males and 193 (48.25%) patients are females, with male to female ratio of 1.07:1. Furthermore; 35 (8.75%) patients aged less than 1 year, 81 (20.25%) patients aged 1-2 years, 87 (21.75%) patients aged 2-3 years, 96 (24%) patients aged 3-4 years and 101 (25.25%) patients aged less than 5 years. The mean age of the study participants was 3.88 ± 1.01 years. It's evident that patients with stunting are statistically significant difference (P value 0.023) regarding poor socio-economic state. From the other hand; patients age 2-3, 3-4 and less than 5, patients' mother of lower educational levels, those of rural residency and poor socio-economic state are shown in statistically risky association. No statistically significant difference and no statically significant association regarding patients' genders, supplementary food intake, child accessory to health facility, mothers; ages, educational levels and occupation. **Conclusion:** This study indicates that the age of the child, the mother's educational level, the child's residency and poverty are the main factors contributing to stunting in Mosul City children under five. Stunting in Mosul City can be decreased by increase mothers' understanding of nutrition, parenting, and health issues for children under five.

KEYWORDS: Short stature, Poverty, Mosul, Talafar City.

1- INTRODUCTION

Stunting, caused by persistent malnutrition, it is a major global issue that hinders human growth.[1-2] Stunting, can results from a protracted period of low nutrition. Malnutrition has short-term implications such as increased morbidity and mortality, developmental problems (Cognitive, Motoric and Language), and higher healthcare costs for sick children.[3-4] It has a negative impact on reproductive health, learning attention, and work productivity over time.[5] Stunting mostly associated with poor reproductive health, learning attention, and work productivity over time. Moreover; short children are susceptible to different non-communicable diseases as they grow up.[6-7]

The indicators of malnutrition in children include stunting, wasting, and being underweight. Stunting refers to a child who is too short for his/ her age, wasting refers to a child who is too thin for his/ her height, and underweight refers to a child who is too light for his/ her age.[8-9] In international settings, it is advised to create height-for-age, weight-for-height, and weight-for-age z-

scores using the WHO child growth standards. Stunted children are defined as having a height-for-age z-score that is less than two standard deviations below the WHO Child Growth Standards median for children of the same age and sex.[9-10] Additionally; Weight for height z-scores less than two standard deviations are considered wasted and suggest acute malnutrition or rapid weight loss.[9-11]

The World Health Organization prioritizes achieving global nutrition targets for children. The major target is to reduce childhood stunting by 40% globally, or 3.9%, between 2012 and 2025.[12] According to United Nations statistics, one out of every eight Iraqi children die before the age of five. Nearly 30% are malnourished, a quarter are born underweight, and another 25% lack access to safe water.[13] The risk factors for stunting in different geographical regions have been thoroughly researched. However, there is insufficient data about Iraq.[14] Gabriela Guerrero-Serdan et al conducted a study in Iraq to analyze the consequences of war on nutrition and health. It was expected that individuals born after the war in high-intensity conflict areas would have lower height-for-age z-scores compared to those born in less violent areas.[15]

The aim of this study to assess the risk factors of stunting among children aged less than five in Mosul City -Iraq.

2- PATIENT AND METHODS

The study is a descriptive, case control study. It was conducted between the 11th of September 2023 to the end of March 2025 at Mosul General Hospital, Talafar General hospital and Al Wafa'a Endocrine specialized center in Mosul. The study included 400 patients randomly selected from the study settings. Ethical approval was taken from the Directorate of Health in Nineveh governorate, another consent was also taken from the parents to participate in the study.

The investigators conducted direct interviews with parents to complete self-administered questionnaires. The questionnaire was divided into three parts. The first section provides demographic information about the study participants, including their age, gender and residence. The second section for the presence of supplemental feeding and child's access to health facility. The third part for mother's educational level, and family's socio-economic state.

Statistically analysis done by using the SPSS (scientific package for social sciences) version 30.0 software. Descriptive statistics, such as frequencies and percentages, were used to present categorical variables in tables and figures. The chi-squared ($\chi 2$) test was used to determine the significance of differences between cases and controls groups. The statistical findings were expressed as odds ratios (OR) and 95% confidence intervals (CI) for each risk factor, P-values less than 0.05 were regarded as statistically significant.

3- RESULTS

The study included 400 patients, of them 128 patients with stunting (cases) and 272 patients with normal weight (controls) and presented for other causes. Moreover; 207 (51.75%) patients are males and 193 (48.25%) patients are females, with male to female ratio of 1.07:1. Furthermore; 35 (8.75%) patients aged less than 1 year, 81 (20.25%) patients aged 1-2 years, 87 (21.75%) patients aged 2-3 years, 96 (24%) patients aged 3-4 years and 101 (25.25%) patients aged less than 5 years. The mean age of the study participants was 3.88 ± 1.01 years. 128 (32%) patients are reside in urban districts while 268 (68%) patients are reside in rural districts. 117 (29.25%) patients received supplemental feeding and 283 (70.75%) patients didn't received supplemental feeding. Additionally; 123 (30.75%) patients reported easy access to medical services while 277 (69.25%) patients reported difficult access to medical services. From the other hand; regarding the demographic information of the study participants' mothers, 349 (87.25%) patients having mothers of more than 20 years while 51 (12.75%) patients having mother of less than 20 years. The majority of mothers are illiterate 162 (40.5%) followed by primary education 114 (28.5%), secondary 95 (23.75%), university 27 (6.75%) and higher education 3 (0.75%). 224 (56%) patients having working mothers and 176 (44%) patients having housing mothers. Moreover; 196 (49%) patients having poor socio-economic state, 192 (48%) patients having sufficient income for daily needs and 12 (3%) patient having exceeded income for daily needs. Lastly; 128 (32%) patients having stunting and 272 (68%) patients haven't stunting. As shown in table 1.1:

Table 1.1: Socio-demographics information of the study participants.

Variable	Number = 400	Percent
Gender:		
- Male	207	51.75
- Female	193	48.25
Age:		
- Less than 1 year	35	8.75
- 1-2 years	81	20.25
- 2-3 years	87	21.75
- 3-4 years	96	24
- Less than 5 years	101	25.25
Residency:		

- Urban	128	32
- Rural	272	68
Supplemental feeding intake:		
- Present	117	29.25
- Absent	283	70.75
Child's access to health facility:		
- Easy	123	30.75
- Difficult	277	69.25
Mother age:		
- Less than 20	349	87.25
- More than 20	51	12.75
Educational level of mother:		
- Illiterate	162	40.5
- Primary	114	28.5
- Secondary	95	23.75
- University	27	6.75
- Higher	3	0.75
Mother occupation:		
- Employed	224	56
- Unemployed	176	44
Social class:		
- Not enough for daily needs	196	49
- Enough for daily needs	192	48
- Exceeds needs	12	3
The presence of stunting:		
- Yes	128	32
- No	272	68

Figure 3.1 shows distribution of the study participants according to their data collection places.

Figure 3.1: Distribution of the study participants according to their place of data collection

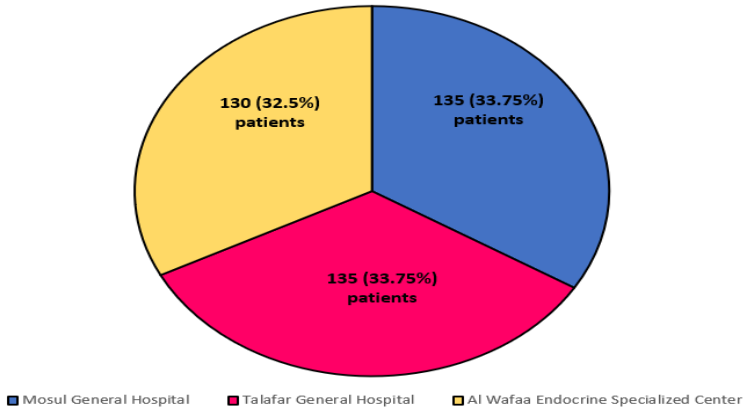

Table 3.2 comparison between patients with stunting and those with no stunting. It's evident that patients with stunting are statistically significant difference (P value 0.023) regarding poor socio-economic state. From the other hand; patients age 2-3, 3-4 and less than 5, patients' mother of lower educational levels, those of rural residency and poor socio-economic state are shown in statistically risky association. No statistically significant difference and no statically significant association regarding patients' genders, supplementary food intake, child accessory to health facility, mothers; ages, educational levels and occupation.

Table 1.2: Comparison between patients with stunting and those with no stunting.

Variable	Patients with stunting, Number (%) = 128	Patients with no stunting, Number (%) = 272	Odds ratio (confidence interval)	P- value
Gender:				
- Male	71 (55.4%)	136 (50%)	1.242 (0.578- 1.892)	0.489
- Female	57 (44.6%)	136 (50%)	0.805 (0.238-1.320)	
Age:				
- Less than 1 year	6 (4.6%)	29 (10.8%)	Ref.	0.248
- 1-2 years	22 (17.2%)	59 (21.8%)	1.852 (1.235-2.335)	
- 2-3 years	33 (25.8%)	54 (19.9%)	3.043 (2.378-7.278)	
- 3-4 years	33 (25.8%)	62 (22.9%)	2.645 (1.928-4.021)	
- Less than 5 years	34 (26.6%)	67 (24.6%)	2.538 (1.268-3.829)	
Residency:				
- Urban	35 (27.3%)	93 (34.1%)	0.725 (0.248-1.392)	0.139
- Rural	93 (72.7%)	179 (65.9%)	1.377 (1.127-1.790)	
Supplemental feeding intake:				
- Present	40 (31.25%)	77 (28.3%)	1.151 (0.563-1.389)	0.304
- Absent	88 (68.75%)	195 (71.7%)	0.868 (0.428-1.234)	
Child's access to health facility:				
- Easy	43 (33.6%)	80 (29.4%)	1.215 (0.329-1.928)	0.678
- Difficult	85 (66.4%)	192 (70.6%)	0.822 (0.390-1.689)	
Mother age:				
- Less than 20	103 (80.4%)	246 (90.4%)	0.435 (0.135-1.203)	0.238
- More than 20	25 (19.6%)	26 (9.6%)	2.295 (0.593-3.789	
Educational level of mother:				
- Illiterate	44 (34.3%)	118 (43.2%)	Ref.	0.264
- Primary	41 (32%)	73 (26.7%)	1.509 (1.129-1.992)	
- Secondary	35 (27.3%)	60 (22.1%)	1.555 (1.059-2.024)	
- University	8 (6.2)	19 (7%)	1.115 (0.578-1.589)	
- Higher	0 (0%)	3 (1%)	---	
Mother Occupation:				
- Employed	69 (53.9%)	155 (57%)	0.882 (0.239-1.303)	0.839
- Unemployed	59 (46.1%)	117 (43%)	1.133 (0.691-1.447)	
Social class:				
- Not enough for daily needs	71 (55.5%)	125 (63.7%)	1.376 (1.029-3.372)	0.023
- Enough for daily needs	57 (44.5%)	135 (70.3%)	0.726 (0.387-0.927)	
- Exceeds needs	0 (0%)	12 (100%)	----	

4- DISCUSSION

Stunting can indicate potential dangers due to poverty conditions, low socioeconomic level, and high prevalence of chronic illnesses.[16] In 2020, UNICEF and WHO reported that roughly 149 million children under the age of 5 were stunted.[17]

In the present study the majority of stunted patient were male but with no relation to stunting and of note the prevalence of stunting increases with age. As inadequate complementary feeding practices during weaning, when infants transition from exclusive breastfeeding to complementary foods, can increase stunting prevalence among children under five, moreover; as children grow older, they may be exposed to additional childhood illnesses and disorders, such as inadequate hygiene and dirty environments, which can hinder their development. Consistent findings obtained by Chatrine Aprilia Hendraswari[18] and Haribondhu Sarma et al[19] study results.

The second risky axis found in the study was mothers with lower educational levels. As the mother's education influences parenting habits, such as regulating nutrition and maintaining children's health. Educated mothers can acquire information from others and improve their awareness and knowledge of childrearing. Education is linked to a mother's understanding of parenting styles and children's dietary needs. The study result goes with the same line of Agung Dwi Laksono et al study results.[20]

The other risk factor found in the study is the rural residency which may reflect per capita income per month of rural communities in addition to health services accessibility which is more difficult in rural areas. Made Ayu Lely Suratri et al had comparable results.[21]

The last dominant risk factor found in the study is the family income not sufficient to their daily needs. As the satisfaction of the family's nutritional needs may be impacted by the overall family income. Food quality, quantity, and diversity are generally lower in families with low incomes. Rizki Aryo Wicaksono et al had a comparable result in his study findings.[22]

The study's findings are limited by a convenience sample of children from only three centers, which may not be representative of all similar-aged children. However; samples from different districts may provide a more comprehensive view of the risk factors of stunting among less than 5 years aged children. Additionally; the study was limited by the absence of information on the nutritional state of families and parasite infections in children, thus those risk variables were excluded.

CONCLUSION AND RECOMMENDATION

This study indicates that the age of the child, the mother's educational level, the child's residency and poverty are the main factors contributing to stunting in Mosul City children under five. Stunting in Mosul City can be decreased by increase mothers' understanding of nutrition, parenting, and health issues for children under five. In general, especially in rural regions, cadres' responsibility in monitoring the development and growth of children under five at the Integrated Healthcare Center needs to be expanded.

ACKNOWLEDGEMENT

We are grateful for the help provided by the medical team at Mosul General Hospital, Talafar General Hospital and Al Wafa'a specialized endocrine center, as well as the careful consideration received from the Nineveh Directorate of Health. Without the help of each of these individuals, this study would not have been possible.

Conflict of interest

About this study, the authors disclose no conflicts of interest.

REFERENCES

1. Soliman A, De Sanctis V, Alaaraj N, Ahmed S, Alyafei F, Hamed N, Soliman N. Early and long-term consequences of nutritional stunting: From childhood to adulthood. Acta Bio Medica: Atenei Parmensis, 2021; 16, 92(1): e2021168.
2. Soliman N, Soliman A, Alyafei F, Elsiddig S, Alaaraj N, Hamed N, Mohamed S, Itani M. Persistent Global Burden of Stunting Among Children. European Journal of Medical and Health Sciences, 2024; 30, 6(2): 15-20.
3. Fernandes C, Le MT. Physical and cognitive development delays as a result of malnutrition early in life, having individual, societal, and economic impacts. Child Refugee and Migrant Health: A Manual for Health Professionals, 2021; 5: 99.
4. Campisi SC, Khan A, Zasowski C, Bhutta ZA. Malnutrition. Textbook of Pediatric Gastroenterology, Hepatology and Nutrition: A Comprehensive Guide to Practice, 2022; 609-23.
5. Lestari E, Siregar A, Hidayat AK, Yusuf AA. Stunting and its association with education and cognitive outcomes in adulthood: A longitudinal study in Indonesia. Plos one, 2024; 6, 19(5): e0295380.
6. Beckmann J, Lang C, du Randt R, Gresse A, Long KZ, Ludyga S, Müller I, Nqweniso S, Pühse U, Utzinger J, Walter C. Prevalence of stunting and relationship between stunting and associated risk factors with academic achievement and cognitive function: A cross-sectional study with South African primary school children. International journal of environmental research and public health, 2021; 16, 18(8): 4218.
7. Litaay SC, Batjo SN. Women's Welfare, Stunting, and Access to Reproductive Rights: An Overview of The Situation in Indonesia. Baileo: Jurnal Sosial Humaniora, 2024; 27, 1(3): 332-43.
8. Verma P, Prasad JB. Stunting, wasting and underweight as indicators of under-nutrition in under five children from developing Countries: A systematic review. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 2021; 1, 15(5): 102243.
9. Shrestha ML, Perry KE, Thapa B, Adhikari RP, Weissman A. Malnutrition matters: Association of stunting and underweight with early childhood development indicators in Nepal. Maternal & Child Nutrition, 2022; 18(2): e13321.
10. Watson KM, Dasiewicz AS, Bassani DG, Chen CY, Qamar H, O'Callaghan KM, Roth DE. Height-age as an alternative to height-for-age z-scores to assess the effect of interventions on child linear growth in low- and middle-income countries. Current Developments in Nutrition, 2024; 1, 8(12): 104495.
11. Marume A, Moherndran A, Tinarwo P, Mahomed S. Development of a Zimbabwean child growth curve and its comparison with the World Health Organization child growth standards. African Journal of primary health care & family medicine, 2022; 13, 14(1): 3278.
12. Jain S, Ahsan S, Robb Z, Crowley B, Walters D. The cost of inaction: a global tool to inform nutrition policy and investment decisions on global nutrition targets. Health Policy and Planning, 2024; 39(8): 819-30.
13. Mohammed ZJ, Alsadaji AJ, Al-Fayyadh S. Understanding Malnutrition in Iraqi Children: Key Insights on Prevalence, Causes, and Solutions.

14. Mohammed ZJ, Alsadaji AJ, Al-Fayyadh S. Understanding Malnutrition in Iraqi Children: Key Insights on Prevalence, Causes, and Solutions.
15. Hama DA. Huda J. Mhamad, Zana B. Najmadden 2, Kaihan H. Hama Salih, Dlkhwaz A. Hama, Hiwa O. Abdullah 3, 4, Karzan M. Hasan 3, Honar O. Kareem 3, Bilal A. Mohammed 3, Fattah H. Fattah 3, 5, Berun A. Abdalla 3, 4, Fahmi H. Kakamad 3, 4, 5* and Shvan H. Mohammed 4.
16. Scheffler C, Hermanussen M, Soegianto SD, Homalessy AV, Touw SY, Angi SI, Ariyani QS, Suryanto T, Matulessy GK, Fransiskus T, Safira AV. Stunting as a synonym of social disadvantage and poor parental education. International journal of environmental research and public health, 2021; 18(3): 1350.
17. Siddiqa M, Zubair A, Kamal A, Ijaz M, Abushal T. Prevalence and associated factors of stunting, wasting and underweight of children below five using quintile regression analysis (PDHS 2017–2018). Scientific Reports, 2022; 25, 12(1): 20326.
18. Hendraswari CA, Purnamaningrum YE, Maryani T, Widyastuti Y, Harith S. The determinants of stunting for children aged 24-59 months in Kulon Progo District 2019. Kesmas: National Public Health Journal, 2021; 16(2): 71-7.
19. Sarma H, Khan JR, Asaduzzaman M, Uddin F, Tarannum S, Hasan MM, Rahman AS, Ahmed T. Factors influencing the prevalence of stunting among children aged below five years in Bangladesh. Food and nutrition bulletin, 2017; 38(3): 291-301.
20. Laksono AD, Sukoco NE, Rachmawati T, Wulandari RD. Factors related to stunting incidence in toddlers with working mothers in Indonesia. International Journal of Environmental Research and Public Health, 2022; 26, 19(17): 10654.
21. Suratri MA, Putro G, Rachmat B, Nurhayati, Ristrini, Pracoyo NE, Yulianto A, Suryatma A, Samsudin M, Raharni. Risk factors for stunting among children under five years in the province of East Nusa Tenggara (NTT), Indonesia. International Journal of Environmental Research and Public Health, 2023; 16, 20(2): 1640.
22. Wicaksono RA, Arto KS, Mutiara E, Deliana M, Lubis M, Batubara JR. Risk factors of stunting in Indonesian children aged 1 to 60 months. Paediatrica Indonesiana, 2021; 24, 61(1): 12-9.