



VALIDATION OF MUAC CUT-OFFS OF WHO FOR DIAGNOSIS OF ACUTE MALNUTRITION AMONG CHILDREN UNDER 5 YEARS IN KARACHI, PAKISTAN

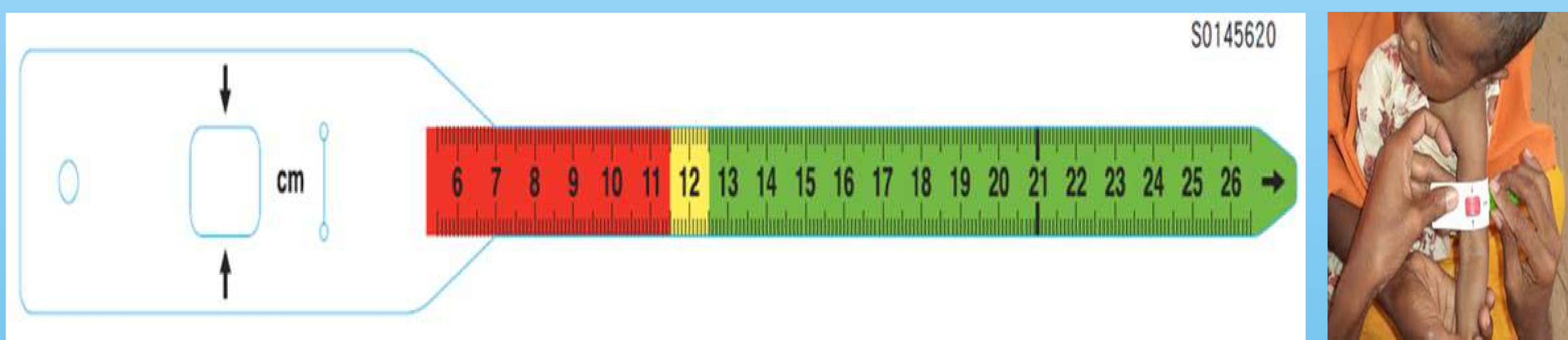
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RATIONALE:

- Validation of MUAC cutoffs have not been done in Pakistan
- There is dearth of local evidence regarding validity of WHO MUAC cut-offs in Pakistani children under five years of age for diagnosis of acute malnutrition
- The study aimed to evaluate the diagnostic accuracy of MUAC for screening SAM and MAM in Pakistani children

OBJETIVES:

- To validate the World Health Organization (WHO) recommended cut-offs of mid upper arm circumference for acute malnutrition screening in children less than the age of five in Karachi, Pakistan



MATERIALS & METHODS:

Inclusion Criteria

- Children from either gender, 6 to 59 months of age presenting at NICH for health care purpose

Exclusion Criteria

- Children with muscular disabilities
- Guardian refused to provide written informed consent

Data Collection Procedure

- A structured questionnaire was used to gather information on socio-demographic characteristics
- Anthropometric data such as weight, height/length, and MUAC was documented by taking measurements according to WHO standard protocol
- The non-flexible measuring tape was used to assess MUAC
- Weight was calculated on the Sico weighing scale
- Clinical examination for prevalent pitting oedema was performed

Plan of Analysis

- The SPSS software version 23 was used to perform the analysis
- Weight, height, and length were entered into the WHO Anthro 3.2.2 converting it into Z-score
- Mean and standard deviations were determined for quantifiable data such as age (months), income (PKR), weight (kg), and height (cm)
- Percentages and proportions were determined for categorical variables such as gender, parent/guardian education, type of residence, and ethnicity
- The correlation between assessment results of WHO MUAC Cut-offs and WHZ score was measured to check the level of agreement by applying Kappa statistics
- Youden Index was determined to calculate the optimal cut-off for MUAC for the diagnosis of SAM and MAM

RESULTS

Table 1: Demographic characteristics of study participants (n= 499)

Characteristics	n	%
Age Group (Months)	6 -12	15.1
	13 - 24	21.2
	25 - 36	22.6
	37 - 48	22.0
	49 - 60	19.2
Sex	Male	53.3
	Female	46.7
Education level of parents	No formal education	15.2
	Primary	12.0
	Secondary	14.6
	Matric	29.1
	Intermediate	20.8
	Graduate	8.2
Monthly Income (PKR) of parents	≥ 20000	21.4
	>20000	78.6

Table 2: Characteristics of study participants with Acute Malnutrition (WHZ & MUAC)

Parameters	Number	Percentage %
WHZ < -3 SD (SAM)	No	90.4
	Yes	9.6
WHZ < -2 to ≥ -3 SD (MAM)	No	72.9
	Yes	27.1
Edema 3 plus	No	97.0
	Yes	3.0
MUAC <12.5(acute malnutrition)	No	89.6
	Yes	10.4
MUAC between ≥ 11.5 to < 12.5cm (MAM)	No	93.6
	Yes	6.4
MUAC <11.5 (SAM)	No	96.4
	Yes	3.6

Table 3: Validity of MUAC for wasting against WHZ <-2

MUAC <12.5	WHZ<-2		Total
	Positive	Negative	
Positive	26	26	52
Negative	22	425	447
Total	48	451	499

Sensitivity = 54.1% and Specificity =94.2% and Kappa= 46.7%,Moderate agreement between MUAC &WHZ

Study is consistent with Cambodia ,2014 MUAC diagnose 396 cases of acute malnutrition ,WHZ diagnose 209 cases as wasting , MUAC & WHZ have a fair level of agreement ,kappa 21.3% with 16.7 % sensitivity & 98.2 % specificity

Table 4: Validity of MUAC for MAM against WHZ ≥-3between <-2

MUAC Between ≥ 11.5 to < 12.5cm	WHZ		Total
	Positive	Negative	
Positive	23	9	32
Negative	112	355	467
Total	135	364	499

Sensitivity =17.0% and Specificity =97.5% and Kappa= 19.2%, Good level of agreement between MUAC & WHZ

Table 5: Validity of MUAC for SAM against WHZ <-3 SD

MUAC <11.5	WHZ		Total
	Positive	Negative	
Positive	15	3	18
Negative	33	448	481
Total	48	451	499

Sensitivity = 31.2 %and Specificity =99.3% and Kappa= 42.4%, Moderate agreement between MUAC &WHZ

Table 6: Sensitivity, Specificity, and Youden Index at various cutoff values of MUAC for optimal point for SAM Contd....

MUAC	Sensitivity	Specificity	Youden Index SEN+SPE-100
11.5	99.3	31.3	30.6
11.6	99.1	33.3	32.4
11.7	98.7	35.4	34.1
11.8	98.4	37.5	35.9
11.9	98.2	43.8	42.0
12.0	98.0	43.8	41.8
12.1	96.9	47.9	44.8
12.2	96.2	50.0	46.2
12.3	95.8	52.1	47.9
12.4	95.3	54.2	49.5
12.5	94.2	54.2	48.4
12.6	90.9	64.6	55.5
12.7	88.9	66.7	55.6
12.8	87.8	66.7	54.5
12.9	86.8	66.7	53.7

CONCLUSION

- MUAC had better performance at cutoff of 12.7 cm and 13.9 cm for early diagnosis of SAM and MAM respectively
- The performance of MUAC at new suggested cutoff improves the screening ability of MUAC

RECOMMENDATIONS

- Higher MUAC cutoff is recommended for screening in children aged less than 5 years in a hospital and community context
- Also studies with larger sample size are needed on the performance of MUAC with larger geographical representation of community

REFERENCES:

Unicef, WHO W. Levels and trends in child malnutrition: key findings of the 2019 Edition of the Joint Child Malnutrition Estimates. Geneva: World Health Organization. 2020.