"Bibliographic Review about Anthropometric Measurements in Mother-Child Dyads“

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Introdution

Anthropometric techniques are diverse and they do require skilled levels in order to be executed. It is important for the nursing workforce to know about the most practical anthropometric techniques to be applied at community or research interventions, especially when mother-child dyads are assessed to know the relationship between Body Mass Index of both. Anthropometric measurements of mother-child dyads are useful in clinics or research, as alterations can be detected on time for preventing health-related issues. Therefore, the objective of this research is to identify the most practical, reliable, and precise anthropometric indicators for mother-child dyads.

Methods

A systematic research was performed at the following databeses: Scielo, Nursery Index, EBSCO, and PubMed using the following keywords: anthropometric, child, mother, and boolean operators ("AND", "OR", and "NOT"). Retrieving articles published in the last five years, a total of 277 articles were obtained. After that, 200 outstanding titles were chosen; then, the summaries without key information for the research were dismissed; consequently, the whole texts were read and 150 articles, either in English or Spanish, were chosen. Finally, 50 of the most accurate articles related to the information of anthropometric measurements of the mother-child dyads were selected for this literature review.

Results

The anthropometric measurements most commonly used as key indicators for evaluating the mother-child dyad were the following: 46 (92%) studies used BMI. The BMI being the most recurrent anthropometric indicator; also, 28 (56%) studies used waist girth; 9 (18%) used hip girth; and 1 (2%) used muscle and fat percentage.

In the other hand, the anthropometric measurements used solely on children were the following: skin folds in 11 (22%) studies; arm girth in 6 (12%) studies; and foot-to-foot electrical impedance in 2 (4%) studies. These ones were ruled out in the case of mothers. Only 1 (2%) study measured exclusively the mother's BMI, which did not occur in the case of the child. It is worth mentioning that only 12% of the articles were performed by researchers who work in the nursing area. Table 1 shows the most relevant articles.

The analyzed articles recommend anthropometric indicators as a practical, reliable, and accurate tool to evaluate nutritional status and detect problems/risks related to the mother-child dyad. Through the analysis of these data, this study suggests that, for the nursing field, the BMI and waist girth measurements are the most convenient to use in clinical practice and to detect health-related problems in a timely manner.

Conclusion

As a conclusion, it could be said that, when evaluating exclusively children, it is recommended to use BMI; tricipital, bicipital, and subscapular skin folds; as well as arm girth. These ones being the most commonly used by researchers. However, when evaluating the dyad, the most common anthropometric measurements are BMI and waist girth for both. that it is important because adressing the most commonly used anthropometric measurements helps to identify the most appropriate methodology to conduct research.

The BMI and waist circumference are considered the most practical anthropometric measurements in both child and mothers. Such measurements can be applied by nurses for clinical or research purposes. Finally, it was concluded that the anthropometric measurements must be individualized according to each clinical or research purpose.

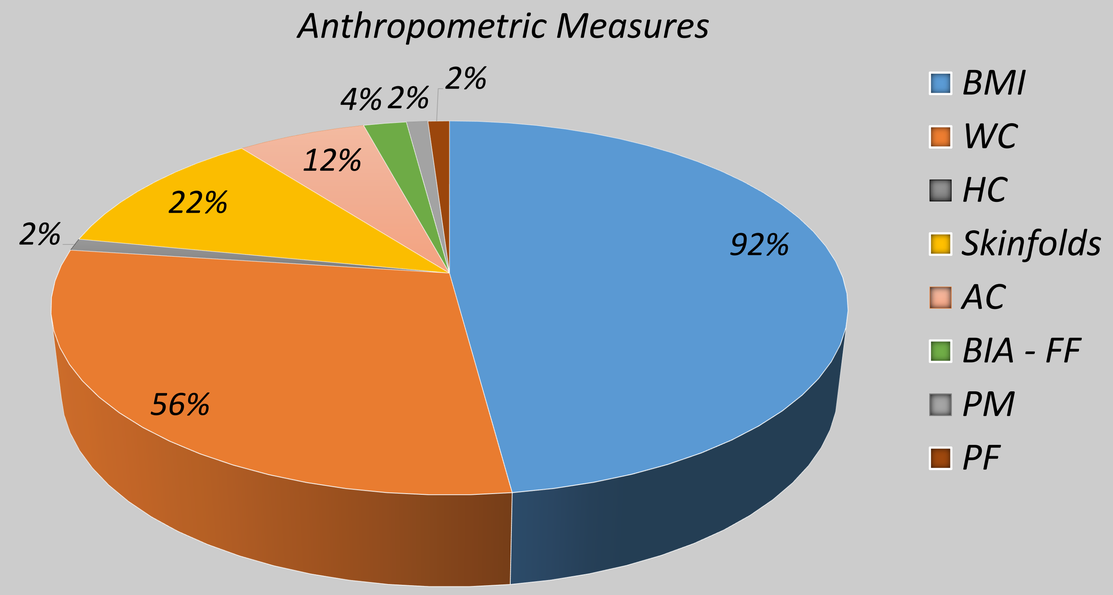

Table. Anthropometric Measures

Study data					Anthropometric Measures																
Study number/ Author, year, country	Mother	Child	Age	*n*	BMI	WC	Skinfolds					SAD	HC	AC	BIA-FF	BF	PM	WrC	BD	BIA-T	CC	Waist-height	Waist-hip
							1	2	4	5	6												
2016 Cuba, Hernández	•	•	RN	582	•	•		•															
2015 Egypt, Aitsi-Selmi	•	•	0 - 03	30.768	•																		
2016 Guatemala, Doak	•	•	05 - 23 m	446	•																		
2016 Nigeria, Udoh	•	•	06 - 08 m	330	•																		
2016 South African, Plessis	•	•	0 - 23 m	322	•																		
2012 United States of America, Morrissey	•	•	3 to 11	990	•																		
2015 México, Ortiz-Félix	•	•	03 to 13	537	•																		
2014 Mexico, Flores-Peña	•	•	3 to 15	2842	•																		
2014 China, Nie	•	•	3 to 17	2618	•	•																	
2014 Brazil, Felisbino-Mendes	•	•	5	4.258	•	•																	
2016 Bangladesh, Hasan	•	•	5	28.941	•																		
2014 Faroe Islands, Tang-Pe'ronard,	•	•	5 to 7	656	•	•																	
2015 United States of America, Kral	•	•	5 to 12	47	•	•		•															
2013 United States of America, Mostazir	•	•	5 to 15	223	•	•																	
2013 Germany, Nehring	•	•	6	7355	•	•																	
2015 United States of America, Jo	•	•	6	1311	•																		
2013 New Zealand, Oliver	•	•	6	386/393		•																	
2015 United States of America, Park	•	•	6	1350	•																		
2016 France, Almoosawi	•	•	6 to 8	361	•																		
2012 Brazil, Bernardo	•	•	07 to 10	1.223	•																		
2015 United States of America, Paul	•	•	7 to 13	253		•																	
2013 Norway, Biehl	•	•	8	3166	•	•																•	
2015 Spain, Mora-Urda	•	•	08 to 11	217	•	•																	
2012 India, Veena	•	•	9	504	•	•		•															
2014 Germany, Z Pei	•	•	10	3230	•																		
2012 Brazil, Cardoso	•	•	10 to 13	120	•	•		•					•		•								
2015 Spain, Gonzalez-Jimenez	•	•	10 to 15	976	•	•		•					•									•	
2015 Brazil, Silveira	•	•	10 to 19	914	•	•																	
2016 Iran, Koomanaee	•	•	12	200	•																		
2013 Br, Gua, India, Phili and South Africa, A	•	•	N/S	7630	•																		
2017 Mexico, Flores-Peña	•	•		566	•																		
2015 Nigeria, Collins	•	•	N/S	262	•																		
2014 Portugal, De Chaves	•	•	N/S	802	•																		
2013 Greece, Karakosta	•	•	N/S	638	•																		

Abbreviations: **Second column:** *BMI= Body Mass Index, WC= Waist Circumference, SAD= Sagittal Abdominal Diameter, HC= Hip Circumference, AC= Arm Circumference, BIA-FF= Foot-To-Foot Bioelectrical Impedance, BF= Body Fat, PM= Percentage Of Muscle, WrC= Wrist Circumference, BD= Bone Density, BIA-T= Tetrapolar Bioelectrical Impedance, CC= Chest Circumference* **Third column:** *n: sample, 1.2.4.5.6: number of skinfolds*

References: 1. Hernández Díaz, Danay, Sarasa Muñoz, Nélida Liduvina, Cañizares Luna, Oscar, Orozco Muñoz, Calixto, Lima Pérez, Yanet, & Machado Díaz, Beatriz. (2016). Antropometría de la gestante y condición trófica del recién nacido. Revista Archivo Médico de Camagüey, 20(5), 477-487. Recuperado en 21 de mayo de 2017, de http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1025025520160005000004&lng=es&tlng=es. 2. Aitsi-Selmi, A. (2015). Households with a Stunted Child and Obese Mother: Trends and Child Feeding Practices in a Middle-Income Country, 1992-2008. Maternal & Child Health Journal, 19(6), 1284-1291. doi:10.1007/s10995-014-1634-5. 3. Colleen M. Doak, Maiza Campos Ponce, Marieke Vossenaar & Noel W. Solomons (2016) The stunted child with an overweight mother as a growing public health concern in resource-poor environments: a case study from Guatemala, Annals of Human Biology, 43:2, 122-130, DOI: 10.3109/03014460.2015.1136356. 4. Udoh, E., & Amodu, O. (2016). Complementary feeding practices among mothers and nutritional status of infants in Akpabuyo Area, Cross River State Nigeria. Springerplus, 5(1), 1-19. doi:10.1186/s40064-016-3751-7. 5. du Plessis, L. M., Herselman, M. G., McLachlan, M. H., & Nel, J. H. (2016). Selected facets of nutrition during the first 1 000 days of life in vulnerable South African communities. South African Journal Of Child Health, 10(1), 37-42. doi:10.7196/SAJCH. 2016.v10i1.984. 6. Morrissey, T. W., Dunifon, R. E., & Kalil, A. (2012). Maternal Employment, Work Schedules, and Children's Body Mass Index. Child Development, 82(1), 66-81. doi:10.1111/j.1467-8624.2010.01541. x. 7. Ortiz-Félix, R. E., Flores-Peña, Y., Cárdenas-Villarreal, V. M., Moral de la Rubia, J., Ruvalcaba, M.D. & Hernández-Carranco, R. G. (2015). Predictores maternos del índice de masa corporal del hijo pre-escolar y escolar. Archivos latinoamericanos de nutrición, Vol. 65 Nº 3, 158-165. 8. Flores-Peña, Y., Avila-Alpirez, H., Trejo-Ortiz, P. M., Ugarte-Esquivel, A., Cárdenas-Villarreal, V. M., Gallegos-Martínez, J., Kshatriya, G. K., & Cerda-Flores, R. M. (2014). Homogeneity of Maternal Perception of Her Child's Weight in Northeastern Mexico. Anthropologist, 17(3): 991-1001. 9. Nie, Peng; & Sousa-Poza, Alfonso. (2014). Maternal Employment and Childhood Obesity in China: Evidence from the China Health and Nutrition Survey. Applied Economics, 46(20), 2418-2428. 10. Felisbino-Mendes, M. S., Villamor, E., & Velasquez-Melendez, G. (2014). Association of Maternal and Child Nutritional Status in Brazil: A Population Based Cross-Sectional Study. Plos ONE, 9(1), 1-8. doi: 10.1371/journal.pone.0087486. 11. Hasan, M. T., Soares, R. J., Williams, G. M., & Mamun, A. A. (2016). Long-term changes in childhood malnutrition are associated with long-term changes in maternal BMI: evidence from Bangladesh, 1996–2011. Am J Clin Nutr 104:1121–7. doi: 10.3945/ajcn.115.111773. 12. Tang-Péronard, J. L., Heitmann, B. L., Andersen, H. R., Steuerwald, U., Grandjean, P., Weihe, P., & Jensen, T. K. (2014). Association between prenatal polychlorinated biphenyl exposure and obesity development at ages 5 and 7 y: a prospective cohort study of 656 children from the Faroe Islands. The American Journal of Clinical Nutrition, 99(1), 5–13. http://doi.org/10.3945/ajcn.113.066720. 13. Kral, Tanja V. E., Reneé H. Moore, and Charlene W. Compher. 2015. "Maternal Concern about Child Weight in a Study of Weight-Discordant Siblings." Public Health Nursing 32, no. 2: 132-142. Academic Search Complete, EBSCOhost (accessed May 21, 2017). 14. Mostazir, M., Jeffery, A., Voss, L. & Wilkin, T. (2013). Gender-assortative waist circumference in mother–daughter and father–son pairs, and its implications. An 11-year longitudinal study in children (EarlyBird 59). Pediatric Obesity, 9, 176–185. doi: 10.1111/j.2047-6310.2013.00157.x. 15. Nehring, I., Chmitorz, A., Reulen, H., Kries, R., & Ensenauer, R. (2013). Gestational diabetes predicts the risk of childhood overweight and abdominal circumference independent of maternal obesity. Diabetic Medicine, 30(12), 1449-1456. doi:10.1111/dme.12286. 16. Jo, H., Schieve, LA, Sharma, AJ, Hinkle, SN, Li, R., y Lind, JN (2015). Índice de Masa Corporal materno antes del embarazo y el desarrollo psicosocial del niño a los 6 años de edad. Pediatrics, 135 (5), e1198-E1209.http://doi.org/10.1542/peds.2014-3058. 17. Oliver, M., Schluter, P., Healy, G., Tautolo, E., Schofield, G., & Rush, E. (2013). Associations Between Breaks in Sedentary Time and Body Size in Pacific Mothers and Their Children: Findings From the Pacific Islands Families Study. Journal of Physical Activity and Health, 10, 1166-1174. doi: http://dx.doi.org/10.1123/jpah.10.8.1166. 18. Sohyun, P., Ruowei, L., & Birch, L. (2015). Mothers Child-Feeding Practices Are Associated with Childrens Sugar-Sweetened Beverage Intake. Journal Of Nutrition, 145(4), 806-812. doi:10.3945/jn.114.207233. 19. Almoosawi, S., Jones, A. R., Parkinson, K. N., Pearce, M. S., Collins, H., & Adamson, A. J. (2016). Parental Perception of Weight Status: Influence on Children's Diet in the Gateshead Millennium Study. PLoS ONE, 11(2), e0144931. http://doi.org/10.1371/journal.pone.0144931. 20. Bernardo, C., Pudla, K. J., Longo, G. Z. & Vasconcelos, F. (2012). Factors associated with nutritional status of 7-10 year-old schoolchildren: sociodemographic variables, dietary and parental nutritional status. Rev Bras Epidemiol 2012; 15(3): 651-61. doi: http://dx.doi.org/10.1590/S1415-790X2012000300018. 21. Paul, T., Sciacca, R., Bier, M., Rodriguez, J., Song, S., & Giardina, E. (2015). Size Misperception Among Overweight and Obese Families. JGIM: Journal Of General Internal Medicine, 30(1), 43-50. doi:10.1007/s11606-014-3002-y. 22. Biehl, A., Hovengen, R., Grøholt, E., Hjelmesæth, J., Strand, B. H., & Meyer, H. E. (2013). Adiposity among children in Norway by urbanity and maternal education: a nationally representative study. BMC Public Health, 13(1), 1-8. doi:10.1186/1471-2458-13-842. 23. Mora-Urda, A. I., Espinoza, A., López-Ejeda, N., Acevedo, P., Romero-Collazos, J. F., Montero-López, M. P. (2015). Indicators of cardiovascular risk, breastfeeding patterns and mother's lifestyle during fetal growth and child development. Nutr. clín. diet. hosp. 35(2):91-100. doi: 10.12873/352morarurda. 24. Veena, S. R., Krishnaveni, G. V., Karat, S. C., Osmond, C. & Fall, C. HD. (2012). Testing the fetal overnutrition hypothesis; the relationship of maternal and paternal adiposity to adiposity, insulin resistance and cardiovascular risk factors in Indian children. Public Health Nutrition: 16(9), 1656–1666. doi:10.1017/S1368980012003795. 25. Pei, Z., Flexeder, C., Fuertes, E., Standl, M., Berdel, D., von Berg, A., & ... Heinrich, J. (2014). Mother's body mass index and food intake in school-aged children: results of the GINIplus and the LISAplus studies. European Journal Of Clinical Nutrition, 68(8), 898-906. doi:10.1038/ejcn.2014.92. 26. Cardoso, O., Castro, S., Rocha, S. M., Rocha, L. F., Garçon de Faria, C. & Priore, S. E. (2012). Comparison of the biochemical, anthropométrie and body composition variables between adolescents from 10 to 13 years old and their parents. Nutr Hosp. 27(4): 1127-1133. doi: 10.3305/nh.2012.27.4.5832. 27. González-Jiménez, E., Montero-Alonso, M., Schmidt-RioValle, J., García-García, C., & Padez, C. (2015). Metabolic syndrome in Spanish adolescents and its association with birth weight, breastfeeding duration, maternal smoking, and maternal obesity: a cross-sectional study. European Journal Of Nutrition, 54(4), 589-597. doi:10.1007/s00394-014-0740-x. 28. Silveira Vieira, R., Dal Bosco, S. M., Quevedo Grave, M. T., & Scherer Adami, F. (2015). Perception of body image of adolescents and of their parents in relation to the nutritional status and blood pressure. Nutricion Hospitalaria, 31(4), 1839-1844. doi:10.3305/nh.2015.31.4.8397. 29. Koomanaee, Sh., Tabrizi, M., Naderi,N., Hassanzadeh, A., Bolokv, M. Y. & Dalili, S. (2016). Parental Anthropometric Indices and Obesity in Children. Acta Med Iran, 2016;54(4):270-275. 30. Addo, O. Y., Stein, A. D., Fall, C. H., Gigante, D. P., Guntupalli, A. M., Horta, B. L., ... Consortium on Health Orientated Research in Transitional Societies (COHORTS) Group. (2013). Maternal Height and Child Growth Patterns. The Journal of Pediatrics, 163(2), 549–554.e1. doi: http://doi.org/10.1016/j.jpeds.2013.02.002. 31. Flores-Peña, Y., Acuña-Blanco, A., Cárdenas-Villarreal, V. M., Amaro-Hinojosa, M. D., Pérez-Campa, M. E. & Elenes-Rodríguez, J. R. (2017). The association between maternal perception of her child weight and maternal feeding styles. Nutr Hosp. 34(1):51-58. doi: http://dx.doi.org/10.20960/nh.975. 32. Collins John1,2, Tomo Ichikawa1, Halima Abdu2, Isaac Ocheke2, Udochukwu Diala2, Virginia Modise-Letsatsi1, Takayuki Wada1, Seline Okolo2, Taro Yamamoto1. (2015). Maternal overweight/obesity characteristics and child anthropometric status in Jos, Nigeria. Nigerian Medical Journal, Vol. 56 236-239. doi: 10.4103/0300-1652.165031. 33. De Chaves, R. N., Baxter-Jones, A., Santos, D., Gomes, T. N., Dos Santos F. K., De Souza, M. C., Diego, V. P. & Maia, J. (2014). Clustering of body composition, blood pressure and physical activity in Portuguese families. Ann Hum Biol, 2014; 41(2): 157–165. doi: 10.3109/03014460.2013.838303. 34. Karakosta, P., Georgiou, V., Fthenou, E., Papadopoulou, E., Roumeliotaki, T., Margioris, A., & ... Chatzi, L. (2013). Maternal Weight Status, Cord Blood Leptin and Fetal Growth: a Prospective Mother-Child Cohort Study (Rhea Study). Paediatric & Perinatal Epidemiology, 27(5), 461-471. doi:10.1111/ppe.12074.