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DEVELOPMENT AND COMPARATIVE VALIDATION OF A DIETARY FAT SCREENER FOR GRADE SIX CHILDREN

by

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Submitted in fulfillment of the requirements of the degree

Philosophiae Doctor

in the

FACULTY OF HEALTH SCIENCES

UNIVERSITY OF PRETORIA

PRETORIA

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2004

University of Pretoria etd – Wenhold, F A M (2005)

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ABSTRACT:

DEVELOPMENT AND COMPARATIVE VALIDATION OF A DIETARY FAT SCREENER FOR GRADE SIX CHILDREN

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Background

Risk factors for chronic non-communicable diseases have been shown to track from childhood into adulthood. Cost-effective intervention starts with valid screening. The aim of this research was development and comparative validation of a dietary fat screener in grade six learners.

Methods

A pictorial, quantitative food frequency questionnaire type, scored dietary fat screener (test method), consisting of ten food categories associated with high fat intakes, was developed and subjected to developmental evaluations in the target group. Subsequently the test method was administered to learners of an urban middle-class school (Pretoria, South Africa). Test-retest reproducibility was checked in a random sub-sample. Two reference methods were used for comparison: Parental completion of the screener and a three-day food record by the children.

Reliability testing of the test method involved measuring internal consistency and test-retest reproducibility. Credibility of energy intakes in the food record was checked. Mean cholesterol intake and percentage fat and saturated fat energy were determined. Comparative validation was based on correlations, mean differences and the Bland Altman method for continuous variables. Percentage agreement, kappa statistics and the McNemar tests were determined for categorical data, as were sensitivity, specificity and predictive values. Receiver operating characteristic curves were plotted.

Results

Sample: Out of 108 children, 39 (100%) were re-tested, 93 (86%) provided usable food records and 78 (72%) parents responded. Mean age was 148±4.4 months.

Reliability: The test method was internally consistent. Test-retest reproducibility of portion size and frequency of intake estimates depended on the food category. No systematic error between administrations was noted as mean category and final score differences between the two administrations did not differ significantly from zero. A significant (r=0.36, P=0.02) correlation existed between administrations, but boys were characterised by random error and a lack of reproducibility (r=0.26, P=0.29), whilst for girls reproducibility could be established (r=0.58, P=0.01).

Comparison to screener by parents: Children and parents did not agree in respect of reported portion size and frequency of intake. Parents had lower values for all scores. Correlation between children's and parents' final scores was 0.23 (P=0.04) (boys: r=0.13, P=0.46; girls: r=0.33, P=0.04), but the mean difference in final scores differed significantly from zero (P=0.0001). Classification was identical in 74% of cases, but when corrected for chance this agreement was also poor.

Comparison to food record: The food record appeared to be a plausible reflection of energy intakes during the recording period. For girls a significant (P<0.05) correlation between test method final score versus cholesterol intake and energy from total and saturated fat was found. The sensitivity of the test method was very high (over 90%). Chance corrected agreement between test method classification and measures of fat intake from the food record was poor. Changing the cut-off of the test method final score could not achieve high sensitivity and high specificity simultaneously.

Conclusion

The dietary fat screener cannot yet be used as sole indicator of high fat intake in grade six learners. Until the discriminatory abilities have been improved, its value lies in creating awareness of high fat intakes and providing a food-based starting point for anticipatory guidance.

Key words: Validity, reliability, reproducibility, nutritional assessment, screening, dietary fat, children, food record, sensitivity, agreement

OPSOMMING:

ONTWIKKELING EN VERGELYKENDE VALIDERING VAN 'N DIEETVET-SIFTINGSINSTRUMENT VIR GRAAD SES LEERDERS

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Agtergrond

Risikofaktore vir latere ontwikkeling van chroniese nie-oordraagbare siektes word reeds in die kinderjare gevestig. Koste-effektiewe intervensie begin met geldige sifting. Die doel van hierdie studie was die ontwikkeling en vergelykende validering van 'n dieetvet-siftingsinstrument by graad ses leerders.

Metodes

'n Kleurprent-gebaseerde, kwantitatiewe voedselfrekwensievraelys-tipe dieetvet-siftingsinstrument (toetsmetode), bestaande uit tien voedselkategorieë met 'n bewese verband met hoë vetinnames, is ontwikkel en onderwerp aan 'n aantal ontwikkelingsstudies in die teikengroep. Daarna is die toetsmetode op leerders in 'n stedelike, middel-sosio-ekonomiese klas skool (Pretoria, Suid-Afrika) toegepas. Toets-hertoets-herhaalbaarheid is in 'n ewekansige sub-groep gekontroleer. Twee verwysingsmetodes is ter vergelyking gebruik: Voltooiing van die siftingsinstrument deur ouers en 'n drie-dag-voedselrekord deur die kinders.

Data-analise van die toetsmetode het betroubaarheidstoetsing in terme van interne, item-konsekwentheid en toets-hertoets-herhaalbaarheid behels. Geloofwaardigheid van gerapporteerde energie-inname in die voedselrekord is gekontroleer. Gemiddelde cholesterol-inname en persentasie energie van totale vet en versadigde vetsure is bepaal. Vergelykings is gebaseer op korrelasies, gemiddelde verskille en die Bland Altman metode vir kontinue veranderlikes. Persentasie ooreenstemming, kappa statistieke en McNemar toetse is bepaal vir kategoriese data, asook sensitiwiteit, spesifisiteit en voorspellingswaardes. "Receiver operating characteristic"-krommes is geplot.

Resultate

Steekproef: Van 108 leerders is 39 (100%) leerders hertoets, 93 (86%) het bruikbare voedselrekords verskaf, en 78 (72%) ouers het gerespondeer. Die gemiddelde ouderdom was 148±4.4 maande.

Betroubaarheid: Die toetsmetode was intern konsekwent. Toets-hertoets-herhaalbaarheid was item-afhanklik. Geen sistematiese fout is tussen die twee toedienings bevind nie, aangesien gemiddelde verskille in kategorie- en finaletellings tussen die twee toedienings nie betekenisvol van nul verskil het nie. ‘n Betekenisvolle (r=0.36, P=0.02) korrelasie is gevind tussen finaletellings in die twee toedienings, maar seuns was gekenmerk deur ewekansige foute en ‘n gebrek aan herhaalbaarheid (r=0.26, P=0.29), terwyl daar vir dogters herhaalbaarheid bevind is (r=0.58, P=0.01).

Vergelyking met sifting deur ouers: Kinders en ouers het nie ooreengestem ten opsigte van gerapporteerde porsiegrootte en frekwensie van inname nie. Ouers het laer waardes vir alle tellings gehad. Korrelasies tussen kinders en ouers se finaletellings was 0.23 (P=0.04) (seuns: r=0.13, P=0.46; dogters: r=0.33, P=0.04), maar die gemiddelde verskil in finaletellings het betekenisvol van nul verskil (P=0.0001). Klassifikasie was identies in 74% van gevalle, maar sodra dit vir toeval gekorrigeer is, was die ooreenstemming swak.

Vergelyking met voedselrekord: Die voedselrekord was geloofwaardig vir die rapporterings-periode. Vir dogters is ‘n betekenisvolle (P<0.05) korrelasie tussen die toetsmetode se finaletellings en cholesterolinname asook totale energie vanaf dieetvet en versadigde vetsure bevind. Die sensitiwiteit van die toetsmetode was baie hoog (oor 90%). Toeval-gekorrigeerde ooreenstemming tussen die klassifikasie deur die toetsmetode en aanwysers van vetinname in die voedselrekord was swak. Verandering van die afsnywaarde van die toetsmetode se finaletelling kon nie hoë sensitiwiteit en hoë spesifisiteit gelyktydig bewerkstellig nie.

Gevolgtrekking

Die dieetvet-siftingsinstrument kan nog nie as alleenaanwyser van hoë vetinname gebruik word nie. Totdat die onderskeidingsvermoë verbeter is, lê die primêre waarde daarvan in bewus-making van hoë vetinnames en in die verskaffing van ‘n voedsel-gebaseerde vertrekpunt vir voedingonderrig.

Sleutelterme: Geldigheid, betroubaarheid, herhaalbaarheid, voedingstatusevaluering, sifting, dieetvet, kinders, voedselrekord, sensitiwiteit, ooreenstemming