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Health-related quality of life in school-aged children with and without asthma in Enugu, South East Nigeria

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Abstract *Background:* Identifying impaired quality of life is a recognized component of asthma management with no published data in Nigerian children with asthma. The aim of this study was to describe the health-related quality of life of school-aged children with and without asthma seen at the Asthma Clinic of the University of Nigeria Teaching Hospital, Enugu.

Methods: Cross-sectional hospital-based study of children aged 7-17 years (with and without asthma) attending the Paediatric Asthma and General Children Outpatient Clinic of the University of Nigeria Teaching Hospital (UNTH) from parts of the south – east region of Nigeria were consecutively enrolled. Quality of life (QOL) scores were obtained using the Paediatric Quality of Life inventory (PedsQL™) questionnaire which measures the core dimensions of health: physical functioning, emotional functioning, social functioning and school functioning.

Results: There were a total of 180 study participants: (90 with asthma and 90 without asthma). Overall quality of life scores for children with asthma was worse than in those without asthma; 75.5, SD19.3 and 82.7, SD14.5 respectively (MD 7.1, CI = 2.3 to 12.3, $p=0.01$). Physical function domain was significantly more

affected in asthmatics than non-asthmatics; 73.4, SD 23.2 vs. 84.4, SD17.3 respectively (MD 11.1, CI = 5.0 to 17.1, $p=0.002$). The psychosocial health summary scores in children with and without asthma were 77.6 SD 18.1 vs. 81.1 SD15.1 (MD 3.5, CI= -1.4 to 8.4, $p= 0.24$), with the highest scores obtained in the social functioning domain for both asthma and non-asthma patients; 82.7, SD 20.3 and 87.6, SD 15.7 (MD 4.9, $p = 0.08$) respectively.

In both the overall and specific QOL domains, boys had higher scores than girls, irrespective of age or socioeconomic status with an inverse relationship between increasing age and QOL scores ($r=-0.2$, $p=0.07$).

Conclusions: Children with asthma showed worse QOL and significant impairment in their physical functioning, more noticeable among the female study population. Information obtained from our QOL study forms a basis for a more informed management plan with regards to which age groups are more affected and the specific domains of health in children with asthma that need to be given closer attention to reduce asthma morbidity. The study emphasizes the need for QOL integration in asthma management for a more holistic approach to outcome evaluation of treatment rather than the physical outcomes.

Introduction

Quality of life is described as the satisfaction felt by an individual with the various aspects of his or her life.¹ It is the individual's perception of his/her position in life in the context of the culture, religion and value systems

in which he or she lives, in relation to their goals, expectations, standards and concerns.¹ Health-Related Quality of Life (HRQoL) is the degree to which a patient's health status affects his/her self-determined evaluation of satisfaction as perceived by that individual.² The measurement of health-related quality of life is based on

the growing recognition that health care should not only focus on the patient's survival or quantity of life but also on the quality of the life.³

Asthma is the most common chronic illness among children globally,^{4,5} and also in Nigeria.⁶ There is evidence of global increase in both prevalence and severity of childhood asthma in the last three decades.^{4,5,7,8} Despite effective asthma medications that are available for symptomatic control, it is reported globally that current treatments have not significantly reduced morbidity or mortality.⁹ With this limitation, there is an increasing tendency to evaluate, using quality of life measures, the impact of asthma and its management on the daily lives and function of affected people and to identify the specific aspects of life with greater associated morbidity.³ Some studies in Europe¹⁰⁻¹² that assessed the effects asthma had on schooling, noted differences in school function as well as academic performance between children with and without asthma. Their studies showed that children with asthma had worse school function scores.¹⁰⁻¹²

In Nigeria few QOL studies have been conducted in children with chronic illness¹³ and the study on asthma was done on adult subjects.¹⁴ This current study was done to document the impact of asthma on quality of life of children with asthma in comparison to their non-asthma counterpart, as well as to document the specific limitations in their health-related quality of life and ascertain any socio-demographic influence on quality of life. Such knowledge will assist the clinician to know the aspects of management that require more focus and thus improve patient outcome.

Materials and methods

Study Design and Population

This was a cross-sectional hospital-based study, whereby ambulatory children with and without bronchial asthma were enrolled consecutively. It was carried out at the University of Nigeria Teaching Hospital (UNTH), Enugu South-east, Nigeria between November 2009 and April 2010. The study site was the Pediatric Asthma and General Children Outpatient (CHOP) clinics of the hospital and the study participants were drawn from this population. The asthma clinic is a major subspecialist clinic that caters for children in most of the south east region. Children seen in the clinics are diagnosed with asthma based on clinical findings in keeping with asthma diagnostic criteria recommended by GINA.¹⁵ Sex and age matched children without asthma and no other chronic illnesses, attending the children outpatient clinic for laboratory result review for non-chronic ailments such as malaria and upper respiratory tract infection were used as controls. Those with chronic clinical conditions e.g. sickle cell anemia, congenital heart disease, seizure disorders that may influence quality of life score, were excluded from the study. Also excluded were children who either had difficulties in

understanding the questionnaire or did not give consent.

Ethical Clearance and Consent

Ethical approval was obtained from the Health Research and Ethics Committee of the hospital. Before commencement of the study, permission to use questionnaire was obtained from the copyright owners.^{16,17} Informed written consent and assent were obtained from caregivers and the study participants respectively.

Measurements and Data Collection

Eligible participants who gave consent were enrolled. Relevant bio-data and medical history were obtained including age and gender. The socio-economic status was calculated using the method suggested by Oyedeji.¹⁸ Other socio-demographic characteristics such as place of domicile, family structure, number of children, and order of birth of the children were not studied. Quality of Life assessment for all the participants was done using the pre-tested interviewer-administered generic quality of life questionnaire, the Pediatric Quality of Life inventory (PedsQLTM).^{17,19} The PedsQLTM questionnaire is a robust validated 23-item generic core scale designed to measure the core dimensions of health: physical functioning (8 items), emotional functioning (5 items), social functioning (5 items) as well as school functioning (5 items). Physical functioning was characterized using the parameters: Running, walking more than one block, participating in sports activity or physical exercise, lifting something heavy, taking a bath, doing chores, having hurts or aches, low energy level. Emotional functioning was characterized using the parameters: feeling afraid or scared, feeling sad, feeling angry, trouble sleeping, worrying. Social functioning was characterized using the parameters: getting along with other children, other children not wanting to be his or her friend, getting teased by other children, not able to do things other children can do, keeping up when playing with other children. School function was characterized using the parameters: paying attention in class, forgetting things, keeping up with schoolwork, missing school because of not feeling well and missing school to go to the doctor or hospital.

The items of the four scales (Physical functioning, Emotional functioning, Social functioning, and School functioning) are grouped together on the actual questionnaire, so it is easy to create score both for each of the scales and summary scores. The PedsQLTM questionnaire is then further summarized into a Physical health summary score and a psychosocial health summary score (a combination of the social, emotional and school functioning).

The PedsQLTM has been used across several cultures and countries including Nigeria¹³ and has been shown to have appropriateness of the conceptual and measurement model, reliability, content validity, interpretability, precision and respondent and administrator acceptability

even when child completed.¹⁷⁻¹⁹ It has a reliability scale and Cronbach's alpha of 0.70-0.93.¹⁹ The questionnaire was pretested for this age group and found to have an internal consistency coefficient ICC (Cronbach alpha) of 0.90, which is within the stipulated range for this questionnaire. The questionnaire had been validated and need not require further except on translation. The questionnaire was administered in the original English language it was developed in and was not further translated. The participants chose the corresponding scores that best expressed any impairment in the various aspects of their lives in the preceding week. Each participant completed the questionnaire in about 9 minutes. The mean of all the scores for each scale was computed as the sum of the items over the number of items answered.

Data Management and Analyses

Information obtained were transferred to electronic data base, prepared using Microsoft Office Excel 2007 and statistical analyses done using the Statistical Package for Social Sciences (SPSS) software version 17. The mean differences in scores between the subjects and controls were calculated and respective confidence intervals derived. Mann-Whitney test (U) was used to determine significance for the health-related quality of life scores among asthma and non-asthma children. Significance level was taken as minimal important difference (MD) of ≥ 0.5 or $p < 0.05$ with a minimum power of 80% for the confidence interval of 95%.²⁰

Results

Of the recruited participants, 17 were excluded based on various exclusion criteria. A total of 180 participants were enrolled into the study (90 children with asthma and 90 without asthma), with comparable socio-demographic characteristics, table 1. The mean age was 11.8 (SD 2.8) years and 11.5 (SD 3.0) years for asthmatic and non-asthmatic children respectively.

The mean QOL scores for asthmatic and non-asthmatic children were 75.5 and 82.7 respectively (MD = 7.2, CI 2.3 to 12.3; $p = 0.01$). When specific domains were assessed, the QOL scores for children with and without asthma, in physical functioning were, 73.4 and 84.4 respectively (MD = 11.1 CI 5 to 17.1; $p = 0.002$ (table II). Children without asthma also had higher scores in all the other QOL domains but without statistical significance, table 2.

The effects of gender, age and socio-economic status on QOL were further studied. The social, emotion and school function which are components of the psychosocial domain were studied together.

Effect of gender, age and social status on quality of life scores

Table 3 shows the performance of children with and without asthma on the PedsQL scale in relation to their

socio-demographic characteristics. For all parameters in both groups (asthmatic and non-asthmatic children), those without asthma had higher QOL scores than those with asthma and the differences were clinically and statistically significant for male gender (MD = 7.3 CI 1.5 to 13.2; $p = 0.02$); age group 14-17 years (MD = 7.5 CI-1 to 16; $p = 0.05$), and socio-economic class III (MD = 11.4 CI 0.5 to 22.3; $p = 0.04$).

Table 1: Distribution of subjects and controls according to age and Socioeconomic Class (SEC)

AGE (years)	Asthma n (%)	Non-Asthma n (%)	Distribution and mean age of study population		
			Asthma Mean age	Non-Asthma Mean age	p value
7-9	24 (48.0)	26 (32.0)	8.5 \pm 0.7	7.8 \pm 0.8	0.001
10-13	33 (46.5)	38 (53.5)	11.1 \pm 1.1	11.6 \pm 1.2	0.05
14-17	33 (55.9)	26 (44.1)	14.9 \pm 1.2	15.1 \pm 1.1	0.70
7-17	90(50.0)	90(50.0)	11.8 \pm 2.8	11.5 \pm 3.0	0.38
SEC					
I	8 (44.4)	10 (55.6)			
II	27 (60.5)	17 (39.5)			
III	32 (58.2)	22 (41.8)			
IV	17 (31.5)	36 (68.5)			
V	6 (54.6)	5 (45.4)			

(SEC $\chi^2 = 11.3$, $p = 0.02$)

Table 2: Health-Related Quality of life scores of children with and without asthma on the Pediatric Quality Of Life scale.

SCALES	Generic quality of life mean scores			95% CI*	p
	Asthma mean score (SD) (n = 90)	Non-Asthma mean score (SD) (n = 90)	Mean Diff		
Total	75.5 (19.3)	82.7 (14.5)	7.2	2.3 to 12.3	0.01
Physical	73.4 (23.2)	84.4 (17.3)	11.1	5.0 to 17.1	0.002
Psychosocial	77.6 (18.1)	81.1 (15.1)	3.5	-1.4 to 8.4	0.24
Social	82.7 (20.3)	87.6 (15.7)	4.9	-0.5 to 10.2	0.08
Emotion	77.9 (23.2)	79.9 (19.9)	1.9	-4.4 to 8.3	0.64
School function	72.0 \pm 19.1	75.7 \pm 17.6	3.7	-1.7 to 9.1	0.29

Table 3: Health-related quality of life in relation to the gender, age and socio-economic status of the study participants.

Subject characteristic	Mean cumulative Generic Quality of Life scores					
	No (n) of subjects asthma: non-asthma	Asthma mean score (SD) (n = 90)	Non-Asthma mean score (SD) (n = 90)	Mean Diff	95% CI*	P
Gender						
Male	50:44	78.5 (15.6)	85.8 (12.5)	7.3	1.5 -13.2	0.02
Female	40:46	71.8 (22.7)	79.8 (15.7)	8.0	-0.2 -16.3	0.12
Age(years)						
7-9	24:26	78.0 (20.8)	88.3 (8.6)	10.4	1.5 -19.3	0.16
10-13	33:38	78.3 (20.8)	81.9 (15.2)	3.6	-4.9 -12.2	0.70
14-17	33:26	70.8 (15.9)	78.3 (16.6)	7.5	-1.0 - 16.0	0.05
SEC						
I	8:10	75.3 (16.8)	83.1 (14.6)	7.8	-7.7 - 23.4	0.25
II	27:17	81.6 (15.9)	85.0 (10.2)	3.4	-5.4 - 12.1	0.85
III	32:22	69.9 (22.0)	81.2 (15.5)	11.4	0.5 - 22.3	0.04
IV	17:36	73.3 (20.4)	81.8 (16.4)	8.5	-2.0 - 19.0	0.10
V	6:5	84.6 (5.4)	87.8 (8.6)	3.2	-6.3 - 12.9	0.31

*CI for mean difference

Effect of gender, age and social status on physical functioning

In the physical function domain, significant differences in scores were noted between the children with asthma and the controls, in all socio-demographic characteristics studied (table 4). Among males, QOL scores for children with and without asthma were 76.0 vs. 88.1 (MD = 12.1 CI 4.9 to 19.3; $p = 0.01$). Using the same scale, the values among the asthmatic and non-asthmatic children aged 14-17 years were 66.4 vs. 82.5 respectively (MD = 16.1 CI 6.4 to 25.8; $p = 0.001$). Though weakly correlated, the QOL decreased with increasing age ($r = -0.2$, $p = 0.07$).

In relation to the socio-economic groups, for the asthmatic and non-asthmatic participants, the significant finding was in SEC III, where the QOL scores were 67.1 compared to 83.0 respectively (MD = 15.9 CI 2.8 to 29.0; $p = 0.01$).

Table 4: Physical functioning quality of life scores in relation to the gender, age and socioeconomic status of the study participants.

Subject Xteristic	No (n) of subjects asthma: non-asthma	Mean Physical functioning Quality of Life scores				
		Asthma mean score (SD) (n = 90)	Non-Asthma mean score (SD) (n = 90)	Mea n Diff	95% CI*	P
<i>Gender</i>						
Male	50:44	76.0 (20.7)	88.1 (12.8)	12.1	4.9 to 19.3	0.01
Female	40:46	70.1 (25.8)	80.9 (20.2)	10.8	1.0 to 20.7	0.07
<i>Age (years)</i>						
7-9	24:26	75.7 (26.4)	89.8 (9.2)	14.1	3.1 to 25.2	0.16
10-13	33:38	78.7 (23.9)	82.1 (20.1)	3.4	-7.0 to 13.8	0.87
14-17	33:26	66.4 (18.4)	82.5 (18.5)	16.1	6.4 to 25.8	0.001
<i>SEC</i>						
I	8:10	70.7 (19.3)	84.2 (10.7)	13.5	-1.1 to 29.3	0.08
II	27:17	79.1 (22.4)	86.6 (12.9)	7.5	-4.5 to 19.6	0.46
III	32:22	67.1 (24.5)	83.0 (22.2)	15.9	2.8 to 29.0	0.01
IV	17:36	70.6 (23.0)	83.2 (18.4)	12.6	0.8 to 24.4	0.93
V	6:5	76.4 (15.1)	83.8 (11.1)	7.4	-13.3 to 11.7	0.64

*CI for mean difference

Effect of gender, age and social status on psychosocial functioning

In the psychosocial health summary score (combination of emotional, social and school functioning), females participants with asthma, had significant lower scores than their male counterparts 73.4 ± 21.7 vs 80.7 ± 13.9 , respectively ($p = 0.05$). Table 5 shows that, even though psychosocial function diminishes with increasing age, socio-economic status age and gender were not significant determinants of the QOL scores. ($r = -0.1$, $p = 0.18$).

Table 5: Psychosocial functioning quality of life scores in relation to the gender, age and socio-economic characteristics of the study participants.

Subject Xteristic	No (n) of subjects asthma: non-asthma	Mean Psychosocial functioning Quality of Life scores				
		Asthma mean score (SD) (n = 90)	Non-Asthma mean score (SD) (n = 90)	Mean Diff	95% CI*	P
<i>Gender</i>						
Male	50:44	80.7 (13.9)	83.5 (14.5)	2.7	-3.2 to 8.5	0.22
Female	40:46	73.4 (21.7)	78.7 (15.3)	5.3	-2.7 to 13.3	0.46
<i>Age (years)</i>						
7-9	24:26	80.1 (17.9)	86.9 (11.1)	6.8	-1.6 to 15.1	0.36
10-13	33:38	77.9 (20.5)	81.8 (13.6)	3.9	-4.3 to 12.0	0.68
14-17	33:26	75.3 (15.6)	74.2 (18.0)	-1.1	-10.1 to 7.8	0.78
<i>SEC</i>						
I	8:10	79.8 (16.0)	81.3 (20.4)	1.5	-17.2 to 20.2	0.76
II	27:17	84.0 (11.3)	83.4 (12.0)	-0.6	-7.9 to 6.6	0.72
III	32:22	72.6 (21.5)	79.5 (2.8)	6.9	-3.4 to 17.2	0.41
IV	17:36	76.0 (20.1)	80.5 (16.9)	4.5	-7.1 to 16.0	0.42
V	6:5	76.4 (15.1)	83.0 (11.1)	7.4	-10.5 to 25.3	0.31

*CI for mean difference

Discussion

This study has demonstrated differences in quality of life between children with asthma and those without asthma, with a statistically significant higher value of the overall quality of life score in the latter. The lower scores obtained in children with asthma is an indication that chronic illnesses such as asthma do affect the quality of life of children, a finding similar with Stein and co-workers,²¹ though differed from the findings of Mansour and colleagues,²² where the defining factor may have been the other extraneous characteristics such as single parenting found among 66% of the group studied, and that may have affected their scores.

This study also demonstrated that children with asthma had greatest limitations in physical activity compared to their counterparts. Lang et al²³ in Baltimore, Maryland (USA) also noted lower scores in the physical domain in children with asthma. It may be inferred that physical function such as full participation in school sports activity, running and strenuous exercise, is limited by asthma.

Psychosocial role and function, including emotions such as fear of death and alienation from peers due to asthma assessed in this study showed important clinical difference but not statistically significant, between the two groups studied. Rechenberg et al,²⁴ and Ricci et al²⁵ found similar attribute of normal emotional function in children with asthma in Sweden and Italy respectively, thus showing no correlation between asthma and poor emotional function. This is further supported by the fact that such economically advanced countries like Sweden

and Italy, who may benefit from social services that provide psychological support to patients as part of their medical package had similar emotional function in relation to asthma, as that found in less privileged countries that may not routinely have access to such psychological support.

The influence of age on QOL score was also noted in this present study, demonstrating a decline in scores with increasing age. This finding is in consonance with other studies.^{24,25} The role of the care-giver as the primary custodian of the health needs of the child in this early stage of life may be a logical explanation for their higher QOL scores. An inclusion of parental opinion to the same questions in our study may have helped to confirm answers given by the children within the lower age group as the understanding of the disease may have affected their response.

How a child perceives his/her quality of life has been found to be influenced by gender.²⁶ Our study showed that males without asthma had significantly higher quality of life scores compared with those with asthma. Also females had statistically significant lower quality of life in all domains when compared to males. Boys are known to report higher scores in self-esteem and self-worth than girls.²⁶ This may explain the lower emotion scores in females in this study, seen in both the children with asthma and the controls without asthma.

A combination of parental level of education and care-giver occupation/income is one of the determinants of the social status. The impact of social status on quality of life assessed in this study showed that socio-economic class did not significantly affect the cumulative quality of life scores when asthmatic and non-asthmatic children were compared. One would assume that availability of resources could mean better management of asthma, and thus better control and better quality of life. However, poor appreciation of the disease by those in the lowest SEC V, or too much insight on the consequence of the disease by those from SEC I, may account for the results obtained. On the other hand, further investigation may be required to explain the results as there are other instruments which use different parameters such as household and livestock possession among others, to measure wealth and socio-economic status.

Conclusions

Children with asthma showed worse QOL and significant impairment in their physical functioning, more noticeable among the female study population. Indications from this study showing great affectation of physical functioning suggests that children with asthma may also require routine screening for exercise induced bronchospasm and may thus be better advised on need for prophylactic use of inhaled bronchodilators before engaging in strenuous physical exercise. The need to introduce QOL questionnaire as routine in asthma clinics may further help identify unique needs in individual patients and form a focus for direct intervention.

The finding of decline in QOL in adolescents may necessitate paying greater attention to children as they approach this age group, possibly attending to them in specialized adolescent clinics to be able to holistically tackle the challenges of this age group which may inadvertently affect their asthma management. Setting up of adolescent clinics is thus encouraged. Information obtained from this QOL study would inform a more directed approach in managing children with asthma and form a baseline data for future research in QOL studies.

Authors Contributors

AA, OT: Conception/funding

AA, OT, IN, IB: Proposal writing, design of the study, manuscript preparation

AA, OT, IN: Acquisition of the data/analysis, interpretation and writing article

AA, OT, IN, IB: Substantial involvement in review

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References

1. The World Health Organization Quality of Life group: The World Health Organization Quality of Life assessment (WHOQOL): Position paper from the World Health Organization. *Soc Science Med* 1995; 41: 1403-1409.
2. Braido F, Bousquet PJ, Brzoza Z, Canonica GW, Compalati E, Fiocchi A: Specific recommendations for PROs and HRQoL assessment in allergic rhinitis and/or asthma: a GALEN taskforce position paper. *Allergy* 2010; 65: 959-968.
3. Spitzer WO. State of Science 1986: Quality of life and functional status as target variables for research. *J Chron Dis* 1987; 40: 465-471.
4. Global Asthma Report 2011. Available at www.globalasthmareport.org. Last accessed April 2013.
5. Kwok MY, Walsh-Kelly CM, Gorelick MH, Grabowski L, Kelly KJ: National Asthma Education and Prevention Program (NAEPP): Severity classification as a measure of disease burden in children with acute asthma. *Pediatrics* 2006; 117:71-77.

6. Faniran AO, Peat JK, Woolcock AJ: Prevalence of atopy, asthma symptoms and diagnosis, and the management of asthma: comparison of an affluent and a non-affluent country. *Thorax* 1999; 54:606-610.
7. Bach JF. The effect of infections on susceptibility to autoimmune and allergic diseases. *N Engl J Med* 2002;347:911-20.
8. Isolauri E, Huurre A, Salminen S, Impivaara O. The allergy epidemic extends beyond the past few decades. *Clin Exp Allergy* 2004; 34:1007-101.
9. Sawyer MG, Spurrier N, Whaites L, Kennedy D, Martin AJ, Baghurst P: The relationship between asthma severity, family functioning and the health-related quality of life of children with asthma. *Qual Life Res* 2001; 9:1105-1115.
10. Sterling DA, Moonie SA, Figgs L, Castro M. Asthma status and severity affects missed school days. *J Sch Health*. 2006;76:18-24.
11. Moonie S, Sterling DA, Figgs LW, Castro M. The relationship between school absence, academic performance, and asthma status. *J Sch Health* 2008; 78:140-8.
12. From the Guidelines for the Management of Asthma in California Schools. Available at www.cdph.ca.gov/programs/caphi/Documents/dhsASTHMAguidelines. Last accessed April 2013.
13. Lagunju I A, Akinyinka O, Ori-madegun A, Akinbami F O, Brown B J, Olorundare E , Ohaeri J: Health-Related Quality of Life of Nigerian children with epilepsy. *AJNS* 2009; 28:1-7.
14. Erhabor GE, Mosaku KS, Morakinyo O: Psychological impact of asthma among a sample of adult asthmatics in South Western Nigeria. *J Nat Med Assoc* 2002; 94:987-93.
15. From the Global Strategy for Asthma Management and Prevention, Global Initiative for Asthma (GINA) 2012. Available from: <http://www.ginasthma.org/>. Last accessed in January 2013.
16. Reichenberg K, Broberg AG: Quality of life in childhood asthma: use of the Pediatric Asthma Quality of Life Questionnaire in a Swedish sample of children 7 to 9 years old. *Acta Paediatr* 2000; 89: 989-995.
17. Varni JW, Limbers CA, Burwinkle TM. Impaired health-related quality of life in children and adolescents with chronic conditions: a comparative analysis of 10 disease clusters and 33 disease categories/severities utilizing the PedsQL™ 4.0 Generic Core Scales. *Health Qual Life Outcomes* 2007; 5: 43-58.
18. Oyedeji GA. Socio-economic and cultural background of hospitalised children in Ilesa: *Nig J Paediatr* 1985; 12: 111 – 117.
19. Varni JW, Seid M, Kurtin PS: The PedsQL: Reliability and validity of the Paediatric Quality of Life Inventory version 4.0 generic core scales in healthy and patient populations. *Med Care* 2001; 39: 800-812.
20. Hulley SB, Cummings SR, Grady D, Hearst N, Newman TB. Designing clinical research. *Philadelphia: Lippincott Williams & Wilkins; 2001. 65 -73.*
21. Stein RE, Westbrook LE, Silver EJ: Comparison of adjustment of school age children with and without chronic conditions: results from community-based samples. *J Dev Behav Pediatr* 1998; 19: 267-272.
22. Mansour ME, Kotagal U, Rose B, Ho M, Brewer D, Roy-Chaudhury A, Hornung RW, Wade TJ, DeWitt TG. Health-Related Quality of Life in Urban Elementary School children. *Pediatrics* 2003; 111: 1372-1381.
23. Lang DM, Butz AM, Duggan AK, Serwint JR: Physical activity in urban school-aged children with asthma. *Pediatrics* 2004; 113:341-346.
24. Reichenberg K, Broberg AG: Quality of life in childhood asthma: use of the Pediatric Asthma Quality of Life Questionnaire in a Swedish sample of children 7 to 9 years old. *Acta Paediatr* 2000; 89: 989-995.
25. Ricci G, Dondi A, Baldi E, Bendandi B, Giannetti A, Masi M: Use of the Italian version of the Pediatric Asthma Quality of Life Questionnaire in the daily practice: results of a prospective study. *BMC Pediatrics* 2009; 9:30 -31.
26. Bisegger C, Cloetta B, von Rueden U, Abel T, Ravens-Sieberer U. Health-related quality of life: gender differences in childhood and adolescence. *Soz Praventiv med* 2005; 50:281-291.