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ORIGINAL ARTICLE

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Health-Related Quality of Life (HRQoL) Among Filipino Children Aged 12-18 Years with Asthma Managed Using the Global Initiative for Asthma (GINA) Two-Track Approach

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ABSTRACT

Background: Children with uncontrolled asthma have a significantly poorer quality of life. Consequently, the Global Initiative for Asthma (GINA) provided two-track options for personalized asthma management to keep symptoms under control.

Objective: This study evaluated the asthma Health-related QOL (HRQoL) by comparing the GINA two-track approach among Filipino children aged 12-18 years in the community setting.

Methods: This community-based cross-sectional study surveyed 132 children aged 12 to 18 years in Santa Barbara, Iloilo, using the Filipino-translated KINDL questionnaire to assess HRQoL across GINA treatment tracks.

Results: At baseline, treatment groups were similar in terms of age, sex, weight-for-age, socioeconomic status, and comorbidities but varied significantly in terms of history of smoking, history of alcohol consumption, and duration of illness since diagnosis. GINA Track 1 was significantly associated with well-controlled asthma symptoms (p <0.001). HRQoL scores were significantly correlated with GINA treatment tracks (r = 0.473; p <0.001). Accordingly, children treated with GINA Track 1 had significantly higher overall mean HRQoL score (p <0.001) and the following domains of HRQoL: physical wellbeing (p <0.001), emotional wellbeing (p <0.001), self-esteem (p = 0.046), family (p = 0.005), friends (p = 0.007), and school (p <0.001).

Conclusion: Children with asthma have compromised HRQoL due to sociodemographic, clinical, and environmental factors; hence, leveraging GINA Track 1 can improve HRQoL.

Keywords: asthma, asthma management, children, quality of life, GINA Treatment Tracks

BACKGROUND

Asthma, which is an inflammatory disorder of profound heterogeneity with strong genetic and environmental components, is one of the most common chronic diseases in children.[1] The prevalence of asthma symptoms in children is 14% while in young adults aged 18 to 45 years, it is pegged at 8.6%, according to the International Study of Asthma and Allergies in Childhood (ISAAC).[2] It is among the top 20 chronic conditions for global ranking of disability-adjusted life years in children. Death rates from asthma in children globally range from 0.0 to 0.7 per 100,000.[3] Globally, the Philippines ranks second in age-standardized asthma-related mortality rates among low- or middle-income countries (LMIC).[4]

The Global Initiative for Asthma (GINA) Strategy Report, which adopted a five-step model for asthma management, provides clinicians with an evidence-based approach that can be adapted to local circumstances. The GINA 2023 treatment for adolescents (12 years and older) recommends selecting one of two asthma management tracks based on the inhaled reliever medication.[5] Track 1, in which the reliever is low-dose ICS-formoterol across all treatment steps, is the preferred and recommended approach. Patients can also take ICS-formoterol as regular daily treatment for Steps 3 to 5, as it has indications as both a reliever and a controller medication, without the need for a short-acting beta$_2$-agonist (SABA). This approach is preferred because it reduces the risk of severe exacerbations compared with using a SABA reliever. On the other hand, Track 2, in which the reliever is a SABA or ICS-SABA, is an alternative if Track 1 is not possible, or if a patient is stable, with good adherence and no exacerbations in the past year on their current therapy. In Step 1, the patient takes a SABA and a low-dose ICS together for symptom relief (in combination if available, or with the ICS taken immediately after the SABA). In Steps 2-5, the reliever is a SABA or combination ICS-SABA. Before considering a SABA reliever, consider whether the patient is likely to be adherent to their ICS-containing treatment.[5] However, in the APPaRENT 2 study done by Chapman, results showed that physicians preferred a preventive regular dosing approach to achieve symptom control for patients with moderate to severe asthma, which is more aligned with GINA 2021 Track 2 recommendations than Track 1.[6] Many patients on Track 1 request additional rescue inhalers, suggesting that Track 1 is being misapplied in most instances and that patients may perceive their asthma as inadequately controlled.[7]

While Track 1 is the preferred approach because of the significant reduction in severe exacerbations, it has similar symptom control as Track 2 using SABA as a reliever. However, patients with good symptom control can still be at risk of severe exacerbations because of the many modifiable risk factors for exacerbations that are independent of symptom control. Hence, GINA 2023 does not recommend assessment tools that combine symptom control.[5] Other conventional clinical measures provide valuable information about the status of the disease. Still, they rarely capture the functional impairments (physical, emotional, and social) that are important to the patients in their everyday lives. Accordingly, assessment of the quality of life among patients is increasingly recognized as an essential aspect of chronic disease,such as asthma.[7] Quality of life assessment yields several benefits, such as aiding in the monitoring of treatment, in combination with clinical measures, in gaining a better understanding of the patient's feelings about their condition, and in enhancing communication between clinicians and patients.[8] In the Philippines, there is a paucity of data in terms of the quality of life among children suffering from asthma. As such, this study evaluated the asthma Health-Related Quality of Life (HRQoL) among Filipino children aged 12 to 18 years in relation to the GINA pharmacologic management strategy using the two treatment tracks.

OBJECTIVES

The study's general objective was to evaluate asthma Health-Related Quality of Life (HRQoL) among Filipino children aged 12 to 18 years managed under the Global Initiative for Asthma (GINA) Two-Track approach in a community setting.

Specifically, the study aimed to characterize the study population, dichotomized according to GINA treatment tracks, in terms of their sociodemographic and clinical characteristics, including age, sex, weight-for-age (Z-score), socioeconomic status, smoking and alcohol history, time since asthma diagnosis, comorbid conditions, and GINA Asthma Symptom Control classification. It also sought to determine whether there were significant differences in HRQoL scores between patients in GINA Track 1 and Track 2 across the domains of physical wellbeing, emotional wellbeing, self-esteem, family, friends, school, and overall HRQoL. Lastly, the study aimed to determine the correlation between HRQoL scores and the GINA treatment tracks.

METHODOLOGY

This analytical observational study employed a cross-sectional design using the Health-Related Quality of Life (HRQoL) questionnaire to compare asthma-related quality of life among Filipino children aged 12 to 18 years according to Global Initiative for Asthma (GINA) treatment tracks in Santa Barbara, Iloilo. Children aged 12 to 18 years living in Santa Barbara, Iloilo, diagnosed with asthma based on identifying both a characteristic pattern of respiratory symptoms such as wheezing, shortness of breath (dyspnea),

chest tightness or cough, and variable expiratory airflow limitation, spirometry, and currently taking either Track 1 or Track 2 medications were included. Supporting a diagnosis of asthma was documented during patient selection, as features characteristic of asthma may improve spontaneously or with treatment. The study employed purposive sampling, a nonprobability sampling method. In this cross-sectional design, all clinical assessments and HRQoL measurements were conducted at a single point in time, and no longitudinal follow-up was undertaken to evaluate changes in clinical status or HRQoL.

Santa Barbara has sixty (60) barangays, of which Western Visayas Sanitarium and General Hospital is located at Barangay Inangayan, one of the most populated areas of the municipality. The hospital, together with the Department of Family and Community Medicine, adopted seven puroks from three barangays in the municipality. The study was conducted in the seven identified adopted puroks of the department, namely Puroks Sagrada Familia and Santa Cruz from Barangay Bolong Oeste; Puroks San Vicente and San Martin from Barangay Inangayan; and, lastly, Purok Milagrosa of Barangay Bolong Este. The study commenced upon Ethics Review Committee approval. The survey and data collection were done from February 1, 2024, until May 2024.

The inclusion criteria were children aged 12 to 18 years living in Santa Barbara, Iloilo, clinically diagnosed with asthma based on signs, symptoms, clinical course, and/or spirometry, and response to treatment for ≥1 year by primary care provider or specialist, and patient on either GINA Track 1 or Track 2 in the past 3 months. The exclusion criteria were adults and children under 12 years of age, patients who are not taking any medications for asthma, less than a year of diagnosis of asthma, children who are being monitored for less than 1 year because of cystic fibrosis, cardiovascular and immunological diseases, malignancy, pulmonary tuberculosis, Bronchopulmonary Dysplasia (BPD)/Chronic Lung Disease (CLD), among others, patients experiencing an exacerbation at the time of enrollment, legal disability or limited legal capacity, refusal of participation and parents who have not signed an informed assent. Informed assent was secured and tailored to inform the participants of rights, risks, and benefits when participating in this study. The Principal Investigator was accountable for explaining informed assent, ensuring the subject understood the information clearly, and obtaining the subject's parent or primary caregiver's voluntary approval to participate in this study. Before giving assent, the participants were informed about the tool used in the study and the data collected.

The research instrument was standardized using the KINDL, which is a generic instrument for assessing Health-Related Quality of Life in children and adolescents aged 3 years and older. The KINDL^R provides 12 items and thus is a short, methodologically suitable, psychometrically sound, and flexible measure of Health-Related Quality of Life in children and adolescents. The Filipino translation of the KINDL was used with the approval of Chiong et al.,[9] and the University of Santo Tomas, who translated and validated the questionnaire. The questionnaire has the following domains: physical wellbeing, emotional well-being, self-esteem, family, friends, and school. 3-point Likert-type scale questions assessed each item. The Likert-type scale questions have positive and negative responses that range from madalas (very often) to minsan (sometimes) to hindi (never). Those who scored above the mean were considered to have a favorable HRQoL, and those who scored below the mean had an unfavorable HRQoL.

The computed minimum sample size is 131. There were 66 patients included in the Track 1 group and 66 patients in the Track 2 group. The researcher encoded the data in MS Excel. Stata MP version 14 software was used for data processing and analysis. Continuous data, such as age and time since diagnosis (years), were presented as mean/standard deviation (SD). Categorical data, including weight-for-age (Z-score), socioeconomic status, smoking history, alcohol use history, GINA asthma symptom control, and comorbidities, were presented as frequencies and percentages. Continuous variables were compared using the independent t-test or Mann-Whitey U test. A point-biserial correlation was used to assess the strength and direction of the association between HRQoL scores and GINA treatment tracks. P values ≤0.05 were considered statistically significant. Charts and graphs were created using MS Excel.

This study complied with Good Clinical Practice (GCP) to ensure that the study was designed, conducted, implemented, recorded, analyzed, and reported scientifically and ethically, while also protecting study participants' rights, integrity, and confidentiality. This study was conducted only after approval by the Research Ethics Review Committee. The method imposed minimal risk related to the privacy and confidentiality of participants' identities. A data privacy assent statement was given to the records section. Furthermore, each subject was assigned an initial and a code number to protect participants' privacy and anonymity. During the study, the participants' names were never revealed. The data controllers removed any identifying information from the dataset before further use and analysis. The data (both variables and their values) were coded in an alphanumeric format for concealment, with only a few designated persons having the coding key. It was ensured that data, especially in electronic format, is accessible only to authorized personnel and is appropriately archived or deleted. These files were accessible

only to the researcher and were not to be released for any purpose other than this study. This study was done in accordance with ICH-GCP Guidelines. The results generated from the study will remain confidential, but these can be used for academic purposes only.

RESULTS

A total of 132 children aged 12 to 18 years were included in the study. Based on GINA guidelines, they were dichotomized into two tracks according to the prescribed treatment regimen.

Table 1 shows the demographic and baseline clinical characteristics of the study population. The mean age of participants was 14.56 (SD ± 2.05) years. There was no significant difference across GINA Tracks in terms of mean age (14.52 ± 2.03 vs 14.61 ± 2.08 years; $p = 0.814$). The Track 1 and Track 2 groups did not differ significantly in sex ($p = 0.384$), weight-for-age ($p = 0.351$), or family socioeconomic status ($p = 0.466$). Among those in Track 1, there was a significantly higher proportion of patients with smoking history ($p = 0.004$) and alcoholic drinking history ($p = 0.001$) compared to Track 2. The duration of illness since diagnosis was significantly longer among those in Track 1 compared to Track 2 (5 ± 1.95 vs 3.80 ± 1.82 years; $p = 0.0004$). While the most common comorbid condition was cardiovascular disease, groups did not vary significantly in terms of comorbidities.

The comparison between GINA Track 1 and Track 2 according to GINA asthma symptom control is presented in Figure 1. The frequency and percentage of patients with well controlled, partly controlled, and uncontrolled asthma in Track 1 and Track 2 were as follows: 52 (78.79%) vs 28 (42.42%); 14 (21.21%) vs 30 (45.45%); and 0 (0%) vs 8 (12.12%), respectively. Well-controlled asthma symptom was significantly associated with GINA Track 1 ($p = 0.00002$).

Table 1. Demographic and baseline characteristics of the study population

Variables	Total (N = 132)	Track 1 (N = 66)	Track 2 (N = 66)	*P*-value
Age, years (Mean ± SD)	14.56 ± 2.05	14.52 ± 2.03	14.61 ± 2.08	0.814
Sex				
Male	65 (49.24%)	30 (45.45%)	35 (53.03%)	0.384
Female	67 (50.76%)	36 (54.55%)	31 (46.97%)	
Weight-for-age (Z-score)				
-3	0 (0%)	0 (0%)	0 (0%)	0.351
-2	13 (9.85%)	8 (12.12%)	5 (7.58%)	
-1	60 (45.45%)	33 (50.00%)	27 (40.91%)	
0	50 (37.88%)	20 (30.30%)	30 (45.45%)	
+1	7 (5.30%)	4 (6.06%)	3 (4.55%)	
+2	1 (0.76%)	1 (1.52%)	0 (0%)	
+3	0 (0%)	0 (0%)	0 (0%)	
Socioeconomic status of family				
Poor	29 (21.97%)	14 (21.21%)	15 (22.73%)	0.466
Low-income class	59 (44.70%)	26 (39.39%)	33 (50.00%)	
Lower middle-income class	38 (28.79%)	23 (34.85%)	15 (22.73%)	
Middle middle-income class	6 (4.55%)	3 (4.55%)	3 (4.55%)	
Upper middle-income class	0 (0%)	0 (0%)	0 (0%)	
Upper-income class	0 (0%)	0 (0%)	0 (0%)	
Rich	0 (0%)	0 (0%)	0 (0%)	
Smoking History	14 (10.61%)	12 (18.18%)	2 (3.03%)	0.004
Alcoholic drinking history	9 (6.82%)	9 (13.64%)	0 (0%)	0.001
Time since diagnosis of asthma (years)	4.40 ± 1.97	5 ± 1.95	3.80 ± 1.82	0.0004
Comorbidities				
Cardiovascular diseases	4 (3.03%)	3 (4.55%)	1 (2%)	0.309
Metabolic disease	0 (0%)	0 (0%)	0 (0%)	1
Neurologic disease	0 (0%)	0 (0%)	0 (0%)	1
Renal diseases	0 (0%)	0 (0%)	0 (0%)	1
Liver diseases	0 (0%)	0 (0%)	0 (0%)	1
Respiratory illness aside from Asthma	0 (0%)	0 (0%)	0 (0%)	1
Congenital disease	0 (0%)	0 (0%)	0 (0%)	1
Others	6 (4.55%)	3 (4.55%)	3 (5%)	1

Table 2 compares the HRQoL scores across GINA treatment tracks. Track 1 and Track 2 differed significantly in terms of the following domains of HRQoL: physical wellbeing (5.55 ± 0.78 vs 4.52 ± 1.23; p = 0.0001); emotional wellbeing (5.63 ± 0.71 vs 4.85 ± 1.04; p = 0.0001); self-esteem (5.18 ± 0.95 vs 4.85 ± 0.95; p = 0.0469); family (5.49 ± 0.77 vs 5.03 ± 1.10; p = 0.0055); friends (5.57 ± 0.76 vs 5.18 ± 0.86; p=0.007); school (5.51 ± 0.82 vs 4.88 ± 1.03; p = 0.0002). Overall, the mean HRQoL score was significantly higher in Track 1 than in Track 2 (32.93 ± 3.13 vs 29.30 ± 4.43, p = 0.0001).

The correlation between HRQoL and GINA treatment tracks is shown in Table 3. There was a positive significant correlation between GINA treatment tracks and the following HRQoL domains: physical wellbeing (r = 0.473, p <0.001); emotional wellbeing (r = 0.430, p <0.001); self-esteem (r = 0.192, p = 0.027); family (r = 0.263, p = 0.002); friends (r = 0.263, p = 0.002); school (r = 0.346, p <0.001); total HRQoL score (r = 0.473, p <0.001).

DISCUSSION

In this study, we evaluated the HRQoL scores of Filipino children aged 12 to 18 years who were managed using the GINA two-track approach. At baseline, a significantly higher proportion of patients in GINA Track 1 had a history of smoking and alcohol drinking and a longer time since diagnosis of asthma compared to the GINA Track 2 group. According to Kim et al., adolescents who smoke cigarettes and consume alcohol were more likely to experience asthma symptoms.[10] The majority of the study population in the community belonged to the low-income class and lower middle-income class but did not differ significantly across groups. Several previous studies have reported that children from low-income families tend to have more severe asthma. As asthma is often not well controlled among children of lower socioeconomic status, symptoms may be severe, increasing the risk of asthma exacerbations and hospital admission.[11]

A significantly higher proportion of children in the community under Track 1 had well-controlled asthma, while uncontrolled asthma was associated with Track 2; this is consistent with the study by Suissa et al.[12] The level of asthma control in children is closely associated with asthma severity and comprehensive management of childhood asthma. Early treatment and family management, especially escalation to asthma medication during the early stage of respiratory infection, are of great importance in asthma control.[13] Symptom control should be optimized with the minimal medication necessary.[14] However,

Table 2. Comparison of HRQoL scores across GINA treatment tracks

Domains of HRQoL	Total (N = 132)	Track 1 (N = 66)	Track 2 (N = 66)	*P*-value
Physical wellbeing	5.04 ± 1.15	5.55 ± 0.78	4.52 ± 1.23	0.0001
Emotional wellbeing	5.24 ± 0.97	5.63 ± 0.71	4.85 ± 1.04	0.0001
Self-esteem	5.02 ± 0.96	5.18 ± 0.95	4.85 ± 0.95	0.0469
Family	5.26 ± 0.97	5.49 ± 0.77	5.03 ± 1.10	0.0055
Friends	5.38 ± 0.83	5.57 ± 0.76	5.18 ± 0.86	0.0070
School	5.20 ± 0.98	5.51 ± 0.82	4.88 ± 1.03	0.0002
Total HRQoL score	31.13 ± 4.23	32.93 ± 3.13	29.30 ± 4.43	0.0001

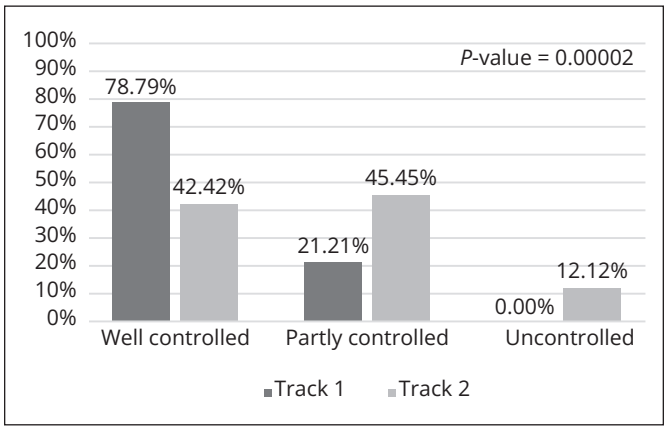

Figure 1. Comparison between Gina Tracks 1 and 2 according to GINA asthma symptom control.

Table 3. Correlation between GINA treatment tracks and HRQoL score

Domains of HRQoL	GINA treatment track	
	r	*P*-value
Physical wellbeing	0.473	<0.001
Emotional wellbeing	0.430	<0.001
Self-esteem	0.192	0.027
Family	0.263	0.002
Friends	0.263	0.002
School	0.346	<0.001
Total HRQoL score	0.473	<0.001

patients in Track 2, who had a higher rate of uncontrolled asthma symptoms, are often exposed to overuse of SABA medication.[15] According to GINA, asthma symptom control not only means how often patients experience asthma symptoms in the last four weeks, wake at night due to asthma, or limitation in activity due to asthma, but also how often patients use a reliever inhaler.[16] Overuse of SABA, which does not treat the underlying inflammation of asthma, is linked to poor clinical outcomes such as increased exacerbation risk.[15] In Track 1, SABA overreliance is avoided because the reliever is as-needed, low-dose ICS–formoterol, which is a fast-acting ICS/LABA.[5]

The study found that HRQoL scores were significantly correlated with GINA treatment tracks. Moreover, patients treated with Track 1 had significantly higher HRQoL scores than those treated with Track 2, indicating that Track 1 patients had more favorable HRQoL. Among children suffering from asthma, HRQoL has been used as a measure of asthma severity/symptoms, emotions, activity limitations, school absenteeism, and emergency visits.[17] Apparently, most studies specify that there is a significant impairment in HRQoL in children with asthma and their families, especially in the rural setting.[18] Children with asthma have a significantly lower quality of life compared with healthy children of the same age. Also, in examining the different aspects of quality of life, these children had lower quality of life in physical, emotional, and school performance. They were at the level of healthy children only in social performance.[19] Our data, however, showed that GINA Track 1 significantly improved the physical and emotional well-being, self-esteem, and family, friends, and school quality of life of the children in the community compared to GINA Track 2. Asthma interventions in the community should help families of children focus on achieving and maintaining low asthma severity to enjoy optimal HRQoL, aligning with GINA recommendations, with Track 1 as the preferred track. Not only this, allergen reduction or avoidance measures should be widely utilized. In a prone host, immune responses to these common contacts can be a stimulant for pathogenic, long-term inflammation and undesired repair of damaged airways. Among children, these pathological trends cause adverse effects on the growth and differentiation of airways, resulting in altered adult airway remodeling.[19] However, there is ongoing controversy on the effectiveness of specific allergen control measures in the management of children with asthma. Often, guidelines do not recommend allergen avoidance strategies because they can be complex or burdensome, although individual patients may benefit from them.[20] Nevertheless, primary care providers should continually assess the child's quality of life at each asthma care visit. Strategic asthma management in children improves symptom control and quality of life.

CONCLUSION AND RECOMMENDATIONS

At baseline, age, sex, weight-for-age, socioeconomic status, and comorbidities did not vary significantly across groups. However, there was a significantly higher proportion of patients with a history of smoking and alcohol consumption in Track 1 compared to Track 2. Nevertheless, track 1 was significantly associated with well-controlled asthma symptoms. HRQoL scores were significantly correlated with GINA treatment Tracks. Accordingly, children treated with GINA Track 1 had significantly more favorable HRQoL scores across all domains. Children with asthma have compromised HRQoL due to sociodemographic, clinical, and environmental factors; hence, leveraging GINA Track 1 can improve HRQoL. Among primary care providers, Track 1, the preferred track of GINA, should be used in community settings and local healthcare systems to improve HRQoL for children with asthma. Assessment of pediatric HRQoL should be integrated into clinical practice because it is a useful indicator of overall health, capturing information on physical, social, and mental health status, as well as the impact of health status on quality of life. Family physicians, specialists, and public health officials should collaborate to reduce asthma prevalence, morbidity, and mortality. Consequently, healthcare professionals can use the findings of this study to develop a suitable clinical pathway and implement evidence-based healthcare measures. For asthmatic children, both the patient and family should be provided with healthcare education to ensure optimal therapeutic outcomes and disease management. It is recommended that future studies assess additional factors affecting HRQoL among asthmatic patients and explore non-pharmacologic strategies to improve it. Moreover, a multicenter study is strongly recommended to develop and evaluate instruments that provide a distinct, reliable measure of the patient's perception of asthma's impact across all key dimensions of HRQoL. This important outcome is not captured in other outcome measures.

Statement of Authorship
All authors fulfilled ICMJE authorship criteria.

Author Disclosure
The authors declared no conflict of interest.

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