DISCUSSION

Bronchial asthma is the most common chronic inflammatory disease in childhood. It may affect up to 35% of population in developed countries. There is marked increase in its prevalence worldwide. [113]

In children younger than 15 years, asthma accounts for 3 million physician visits, 570,000 emergency department visits, 164,000 hospital stays, 8.7 million prescriptions and 10 million missed school days per year. [114]

Achieving asthma control remains an elusive goal for the majority of patients worldwide. [115,116] This troublesome reality persists despite the availability for over two decades of international asthma management guidelines and asthma therapies of proven efficacy. [117,14] Poor asthma control places a heavy burden on patients and their families, as it manifests in increased rates of hospitalizations and emergency room and other urgent care visits, in addition to activity limitations, night-time awakenings, and lost time from school. [118] Moreover, poor asthma control is expensive, accounting for most of asthma-related health-care costs. [119] The global asthma insights and reality (AIR) surveys provide direct evidence for suboptimal asthma control in many patients worldwide, despite the availability of effective therapies, with long-term management falling far short of the goals in the GINA guidelines. [120]

Asthma control, as recommended by guidelines, has been shown to be satisfactory in less than 30% of children. [121]

The aim of the present study was to determine possible causes of treatment failure of asthmatic children attending the asthma clinic in AUCH.

In this study 100 sequential asthmatic children aged less than 15 years presented to the asthma clinic of AUCH were assessed for possible causes of treatment failure through a special questionnaire.

All children included in this study were classified according to the level of asthma control into three groups: controlled, partially controlled and uncontrolled group as defined by GINA Guidelines. [14]

This study showed that the level of optimal control remains unsatisfactory in children with (42%) of children being controlled and (58%) were insufficiently controlled (43% were partially controlled and 15% were uncontrolled). Bloomberg et al [122] reported that of 362 asthmatic children, asthma was controlled for 24% of children and insufficiently controlled for 76% of cases. (Partially controlled were 20% and uncontrolled were 56%). De Blic et al [121] reported that 27% of 1410 asthmatic children included in their study were controlled and 73% were insufficiently controlled (the partially controlled cases were only 7% and the uncontrolled were 66%). Mc Ghan et al [123] reported that 25% of 153 asthmatic children aged five to 13 years included in their study were controlled and 75% were poorly controlled. The relatively higher percentage of controlled asthmatic children in current work compared to the aforementioned studies may be due to the smaller study population and all patients were collected from asthma clinic of AUCH which follow the GINA guidelines of asthma management and the patient were regularly followed up.

In the present study, the age of asthmatic children ranged from 3-13.5 years with a mean age of 6.26±3.11. About half (48%) of the studied cases were below 6 years. Elsaify et al [124] showed that, the mean age of the studied patients was 5.27±3.65. Also Pearlman et al [125] and Tay et al [126] who studied asthmatic children in USA and Ginde et al [127] who carried out study in Canada, they found the range of age from 4-17years. Also Wu et al [128] carried out a study in China on 32 children with asthma and they found the range of age was from 5-12 years. Similarly, Deraz et al [129] found the mean age of patients in a study done in Ain Shams University was 7.5 years and ranged from 5-12 years.

In the current study, no significant age differences were found between controlled, partially controlled and uncontrolled asthmatic patients. In contrary, Kuehni and Frey [130] found that poor asthma control remained significantly associated with young age. This difference might be explained by the small sample size in the current study.

The present study showed that about two third (68%) of the studied children were males (male: female =2:1). This goes with Abd El-khalek et al [131] who found high male to female ratio (2.5:1) and the study done by Camargo and Richardson [132] and Mandhane et al [133] who repored gender differences in asthma with more male affected by asthma prior adolescence and more females during adolescence and adulthood. Furthermore, Sears et al [134] found that asthma is predominantly more common and more severe in boys than girls and is almost twice as frequent in males as in females before the age of six years. Krauss et al [135] found that male: female ratio was 1.5:1. Also Arruda and coworkers [136] considered that male sex is a risk factor for asthma up to the age of puberty and the study done by Al muteiri et al [137] found that males were more encountered in young age; by advancing of age the female proportion increases. Also Hossny et al [138] showed that, the risk of developing bronchial asthma was higher for boys than girls. Similarly, the study done by Mayada [139] found that male: female ratio was 1.3:1. As regards asthmatics groups, no significant sex differences were found between controlled, partially controlled and uncontrolled asthmatic patients. This indicates absence of sex influence on the degree of asthma control.

The male sex predominance in early pediatric asthma may be explained by male – female difference in patterns of lung growth and maturity; susceptibility to infection among boys and difference in exposure to environmental risk factors (Bausman). [140] Another explanation by Martinez [141] considered that boys are more sensitized due to immune factors and lung specific factors and both are important and acting together in the first years of life.

The previously mentioned studies were not in agreement with the studies done by Khaldi et al, [142] El Shafey [143] and Awad [144] who reported that no sex difference in pediatric asthma. Also the study done by Antonia et al [145] showed male: female ratio 1:1 because they studied the prevalence of asthma in children and adolescents in a city in the Brazilian Amazon region not children only. Also, Sanchez, et al [146] showed that the gender distribution was 51.8% boys and 48.2% girls.

The present study showed that the percentage of asthmatic children living in urban areas was significantly higher than those living in rural area. Concerning asthmatic groups, percentage of uncontrolled asthmatic children living in urban areas was significantly higher than that of partially controlled and uncontrolled groups. This may be due to air pollution, crowdedness of people and cross infections as trigging factors. This goes with Colilla et al [147] and Graham [148] that found a higher percentage of asthmatic students were

living in urban areas compared to asthmatic students living in rural areas and they explain that by high air pollution in urban areas. Similarly, Krauss et al [135] found that 85% of patients came from a district town and 15% from rural areas. Similarly, in a study done by Mayada [139] the result showed that the urban percent was 90% and the rural percent was only 10%.

In contrast to a study done by Singh [149] who found no significant difference in the prevalence of asthma among urban and rural areas children, and prevalence was high among families who use fuel for cooking such as coal fires, cow dung, oil stoves, and fire wood among rural population. Moreover, Fouda et al [150] found that no great difference between prevalence of childhood asthma in urban and rural areas that may be explained by similarity in environmental conditions in both areas due to close proximity to each other in the crowded Nile Delta region.

In the present study attending a school or day care center was associated with good asthma control with significant difference between the 3 studied groups. Comparing the studied asthmatic groups, the percentage of asthmatic children who were not attending a school or day care center was significantly higher in uncontrolled group compared with partially controlled or controlled groups (60%, 18.6% and 16.7% respectively). This result may be explained by the greater exposure to passive smoking, household allergens, damp and/or bad housing conditions in children who did not attend school or daycare center. Concerning impact of attending a school or day care center, Ball et al [151] reported that the incidence of asthma among children who attended day-care before 6 months was significantly lower than that among children who did not attend day-care center.

In the present study, allergic rhinitis was the commonest associated allergic disease (43%) in the studied asthmatic patients. Followed by skin allergy (15%) and allergic conjunctivitis (12%). Concerning asthmatic groups, there were no significant differences between asthmatic groups regarding associated allergic diseases. This result may be explained by small sample size. Krauss et al [135] in their study in children with bronchial asthma found that in (76%) of cases asthma was concomitant with allergic rhinitis , less with atopic dermatitis (36%) and lack of any concomitant disease was noted in (32%)of children. Hosney et al [138] found that more than half of the studied cases of asthma had an associated allergic disease (25.8% had associated allergic rhinitis, 17.8 % had allergic dermatitis and 9.7% had food allergy). Oni al [152] in their study found that allergic rhinitis occurred more frequently with asthma (75%) than conjunctivitis (54%) and dermatitis (30%).

The present study showed that the studied asthmatic patients had a family history of asthma in (73%) in their 1st and 2nd degree relatives followed by allergic rhinitis (36%) in their 1st and 2nd degree relatives. This was in agreement with Higgins et al, [153] Arschad et al [154] and Nava et al [155] who found that a family history of atopy was in majority of their cases. Also Anwar et al [113] in a study of asthmatic patient stated that positive family history of bronchial asthma was found in 55% of the patients. The study of El-Saify et al [124] revealed a positive family history of asthma in 58.5% of the asthmatic cases. Similarly, Hossny et al [138] found that family history of bronchial asthma was positive in (31.8%) of his studied patients and (9%) had family history of other atopic diseases in 1st, 2nd, or 3rd degree relatives. In a study done by Magdy et al [156] positive family of allergy in asthmatic children was 67.6%. Oni et al [152] found a strong evidence of genetic contribution to

asthma in 81.3% of patients. Also Alaa et al [157] found that a higher percentage of asthmatic students among students with positive family history of atopy compared to students without family history of atopy. Concerning asthmatic groups, there were no significant differences between asthmatic groups regarding family history of allergic diseases. This result may be explained by unreliable parent history and small sample size

The present study showed that upper respiratory tract infections (URTI) were the commonest trigger for asthma in 86% of asthmatic patient, followed by tobacco smoke exposure, cold air, home dust, perfumes and other irritants. There were no statistically significant differences between the studied asthmatic groups and continuous exposure to triggers. This may explained by unreliable parent history and fear of self-blame. Almuteiri et al [137] mentioned that the most common factors aggravating asthma attacks were respiratory infections (67%), seasonal or climatic variations (18.3%), exercise (12.5%) and exposure to animal dander (5.8%). Also Anwar et al [113] found that smokes and dust were recorded as the main aggravating factors by high percentage of the participants (93.9% and 90.1% respectively), followed by perfumes & bakhour (80.2%) then the weather changes (76.3%) and common cold (63.4%). Anxiety, stress, exposure to animals and intake of some types of food were mentioned by smaller percentage of students (51.1%, 42% and 32.8% respectively).

Oni et al [152] found that the provoking factors of asthmatic attack in children include a cold weather (91%), environmental smoke (83%), home dust (75%), sports (63%), upper respiratory tract infections (55%), emotions (53%), perfumes (49%), tobacco smoke (46.7%), cold water (36.7%), insecticide (29%), food (24%), hair spray (24%), animal dander (23%), walking (20%), daily work (18%), drugs (15.8%), overfeeding (15.8%) and stress (5%). Moreover, Hossny et al [138] stated that viral infections were the commonest precipitating factor of bronchial asthma exacerbation in his patients (38.6%).This was followed by exposure to cold (36.7%), followed by indoor allergens (35.1%), fumes (33.6%), foods (32.2%) and psychological stress (15.9%).

In the present study the level of asthma control was not affected by the duration of asthma. This finding is not in agreement with the study done by De Blic et al [121] who reported that poorer asthma control was associated with more recent diagnosis of asthma.

The present study showed that there was no significant differences between the 3 studied groups as regard asthma severity before starting treatment. This was comparable with other studies which found that control is less likely to be dependent on the disease severity because severity is closely related to the treatment response (i.e. degree of control). [47] Many authors stated that asthma severity depends on both the intrinsic disease severity and the response to treatment and also it is well known that asthma severity is changing over periods of months and years. So, most recent asthma management guidelines depends on degree of asthma control rather than asthma severity before start of treatment in classifying the disease severity.[47] Barnes and Woolcock [158] reported in their study that the severely asthmatic patient still had poorly controlled asthma, with frequent symptoms and exacerbations despite use of high-dose ICS. Also Chung et al [159] reported that a considerable number of children with severe asthma were uncontrolled despite ICS treatment. In contrast, Gianniou and Rovina [160] reported that patients with severe asthma can be well controlled, while those with mild underlying disease can show signs of poorly

controlled disease. This difference was depending on their adherence to the prescribed treatment (complaint or non-complaint).

In the present study frequent acute exacerbations were associated with poor control with significant difference between the three studied groups, being highest in uncontrolled group and lowest in controlled group. These finding were in agreement with the results of Frey [161] who reported that asthma exacerbations are seen in uncontrolled asthma and are often a feature of difficult asthma in children.

In this study inappropriate treatment of asthma was associated with poor control with significant difference between the three studied groups. Aslam et al [162] reported that asthmatic patients whose disease was managed inappropriately would be admitted to hospital more frequently for respiratory indications and would need more physician visits for these conditions than patients whose asthma was managed appropriately. They had poor asthma control and potentially poorer quality of life and that would entail greater health care expenditures.

Many factors have an impact on the benefit that a patient receives from asthma medication. For example, we do not know how the children used their inhalers and whether they properly used them; the improper use of inhaled devices in children, adults and medical personnel is well documented. [163] It is possible that many parents and children were not adequately educated on the rationale for using, how and when to use, and the side effects and the potential effects of not using an inhaled anti-inflammatory therapy, thus causing erratic or discontinued use. Interestingly, a significant improvement was found in those receiving inhaled anti-inflammatory therapy with prior asthma education, regardless of when education occurred and whether they had an action plan. For various, often well-intended reasons, parents often do not follow prescribed medication regimens.[164] Assessment and education about medication use, frequency and technique are vital.

In this study, poor compliance was found to be significantly higher in uncontrolled asthmatic group. The causes of bad compliance in this study were mainly: low socioeconomic status (major cause), wrong parental beliefs and attitudes (if the controller medication should be used daily, worries about the side effects of the drugs and lack of interest of the parents). These findings are in agreement with the results of Dekhuijzen et al [165], Gamble et al [166] and Jentzsch et al [167]who reported that poor compliance being the probable mechanism for poor asthma control and good adherence to prescribed medication is needed for optimal asthma control. Lynd et al [168] and De Vrieset al [169] described that there is a relationship between poor control and low socio-economic status.

As regards inhaler technique it was found that poor technique was associated with uncontrolled asthma with significant difference between the three studied groups. The common errors noted in the inhalation technique in the study include: not shaking the inhaler, coordination problems and no time space between puffs. Dekhuijzen et al [165], Giraud et al [170], Gulrajani [171] and Gianniou and Rovina [160] reported that problems with inhaler technique are common in clinical practice and can lead to poor asthma control. Indeed, asthma control worsens as the number of mistakes in inhaler technique increases. In addition Leyshon [172] reported that correct use of inhaler device will achieve good asthma control.

In the current study, there was no association between presence of side effects of drugs and degree of asthma control. Clatworthy et al [173] reported in his survey that one third of patients were concerned about potential side effects; many patients who did not report ICS side effects were still concerned about possible problems in the future. Often, concerns were based on beliefs about the dangers of medication, including worries about long term effects, the risks of becoming too dependent on medicines, and beliefs that ICS would become less effective in future if used regularly as prescribed.

SUMMARY

Asthma represents the most common chronic illness in children and an important clinical and public health problem. [121] The goal of asthma treatment is to achieve and maintain clinical control, defined as patients having a normal lifestyle with no limitations in their activities and a normal pulmonary function. [14]

Asthma control, as recommended by guidelines, has been shown to be satisfactory in less than 30% of children. [121] This motivated us to carry out this study aiming to determine possible causes of treatment failure of asthmatic children attending the asthma clinic in AUCH.

The study was conducted on 100 sequential asthmatic children aged <15 years. All patients were subjected to thorough history taking, complete physical examination and a predesigned interviewing questionnaire to assess possible causes of treatment failure.

The studied cases were classified according to their level of control into 3 groups: controlled, partially controlled and uncontrolled groups. The results showed that the asthma control is still unsatisfactory where only 42% were controlled while 43% were partially controlled and 15% were uncontrolled. There was no significant statistical difference between the 3 groups regarding the age, sex, parent sociodemographic characteristics, child history of associated comorbidities, family history of allergic diseases and continuous exposure to triggers.

On the other hand, poor asthma control is significantly associated with living in urban areas, not attending school or day care center, inappropriate asthma treatment, inadequate doses, bad compliance and poor inhaler technique.

CONCLUSION

The present study shows that asthma control remains unsatisfactory, with less than half of children having an acceptable level of control. Several variables associated with poor asthma control were identified. These variables include urban residency, not attending school or daycare center, inappropriateness of asthma treatment, inappropriate doses of drugs, poor compliance, and incorrect technique of inhaler intake. On the other hand, child age, sex, parent sociodemographic characteristics, child history of associated comorbidities, family history of allergic diseases and continuous exposure to triggers had no influence on the degree of control of asthmatic patients.