CHAPTER-II

2.1 REVIEW OF LITERATURE

A review of literature is an essential aspect of a scientific research. It provides a basis for future investigations. It justifies the need for replication, throws light on the feasibility of the study, indicates constraints of data collection and helps to relate the findings from one study to another with a view to establish a comprehensive body of scientific knowledge in a professional discipline. Related literature, both research and non-research was explored to broaden the understanding and gain an insight into the selected problem under study. The following key words were used in this search: Asthma, Knowledge, attitude and self-efficacy, Quality of life, pulmonary function test, spirometer, peak flow meter, yoga for asthma, pranayama and asana.

This chapter consists of two sections:

Section A: 2.1 Related literature

Section B: 2.2 Conceptual framework

2.1 Related literature

The related literature are presented under the following headings

2.1.1 Incidence and Prevalence of bronchial asthma

2.1.2 Effects of teaching programme / education on asthma

2.1.3 Research related to asthma control

2.1.4 Research related to Quality of life among asthmatics

2.1.5 Research related to effect of yoga on Quality of life

2.1.6 Research related to effects of yoga on pulmonary functional measures
2.2 Conceptual framework

Modified conceptual framework based on Nola J. Pender (1996) health promotion model is used for this study.

2.1.1 Incidence and Prevalence of bronchial asthma

Ding YP (2012) investigated the prevalence and risk factors of bronchial asthma in the Li ethnic group in China. Subjects with asthma-like symptoms were identified and the prevalence rate was 3.38%. The findings revealed that aging, agriculture industry, rural residence, family history of asthma, history of allergies, cold air, inhalation of irritant gases, smoking, domestic cooking fuel and living environment were associated with increased risk of asthma. This high prevalence rate highlights the importance of asthma prevention and treatment and hence elevating public awareness about asthma in local communities that will benefit the prevention of the disease.

Gao et al (2011) investigated the prevalence of asthma in China’s Qinghai Province in 27,851 adults between 2006 and 2007. The prevalence of asthma in rural, urban, half-farming and half-herding areas, and in pastoral areas was 0.64%, 0.27%, 0.15% and 0.04% respectively; the highest incidence was in rural areas and lowest in the pastoral areas. The findings revealed that overall prevalence was 0.38%. The prevalence of asthma in higher altitudes was lower than that in the lower altitudes, and was lower in herdsmen as compared to other occupational populations.
Anuradha, Lakshmi Kalpana, Narsingarao (2011) estimated the prevalence of different types of bronchial asthma and define their risk with age, gender, type of cooking fuel, dwelling area, occupation and income, education, dietary habit, family history, atopic dermatitis, smoking and alcoholic habit and diabetes in Visakhapatnam, Andhra Pradesh, India. Out of 120 subjects surveyed, 34 were females and 86 were males. The type of asthma is distributed as cough-variant asthma (50.83 %), nocturnal asthma (17.5 %), allergic asthma (20.83%) and occupational asthma (10.83%). 59.16 % showed genetic predisposition, 20 % were atopic dermatitis, 25 % were smokers, 20 .5 % were alcoholics and 44.6 % were with diabetes. Advancing age, usual residence in urban area and lower socio-economic status were associated with significantly higher odds of having asthma.

Guddattu V, Swathi A, Nair NS (2010) aimed to find out the prevalence and risk factors for asthma among Indian women aged 15 to 49 based on Indian National Family Health Survey-3. The overall prevalence of asthma was 17 per 1,000 women. Overweight, obesity, exposure to alcohol, smoking, use of biomass for cooking, and low education are proven to be risk factors for asthma. The study result showed that exposure to biomass fuels were observed to have high population-attributable risk percentage (19%, 18.6%). Control of these variables may reduce major burden of asthma.

Gupta PR, Mangal DK (2006) determined the prevalence and risk factors for bronchial asthma in Jaipur district of Rajasthan among 8863 respondents (5010 men, 3853 women). The findings revealed that the overall prevalence was 0.96 %. Advancing age, residence, tobacco smoking, hookah smoking were associated with significantly higher odds of having asthma.
Aggarwal AN, Chaudhry K, Chhabra SK, D’Souza GA (2006) conducted a field survey in Chandigarh, Kanpur, and Bangalore about prevalence and risk factor for bronchial asthma in Indian adults, through a two stage stratified sampling and uniform methodology using a previously validated questionnaire. Besides demographic data, information on smoking habits, domestic cooking fuel used, atopic system, and family history of asthma was collected. Data from 73,605 respondents were analyzed. One or more respiratory symptoms were present in 4.3 to 10.5%. Asthma was diagnosed in 2.28%, 1.69%, 2.05% and 3.47% respondents at Chandigarh, Delhi, Kanpur and Bangalore with overall prevalence of 2.38%. This study pointed out a high overall national burden of the disease.

Morrison T, Callahan D, Moorman J, Bailey C (2005) conducted a study in USA to evaluate the asthma prevalence by urban- rural residence. The samples from 50 states all over USA were included in the study and calculated asthma prevalence estimates and generated odds ratios (ORs) for the probability of reporting asthma. The study result shows that overall asthma prevalence (7.9%; 95%CI = 7.73-8.08) which was not statistically different (p = 0.28) by urban-rural residence. After adjusting for selected characteristics, adjacent metropolitan (OR = 0.96; 95% CI = 0.90-1.02) and remote showed (OR = 0.95; 95% CI = 0.85-1.05) residents were less likely and metropolitan (OR = 1.04; 95% CI = 0.93-1.16) residents were more likely to report asthma compared with metropolitan residents. The study concluded that asthma prevalence is as high in rural as in urban areas.
Shrestha (2005) examined the relationship between residential exposure to solid biomass fuels (animal dung, crop residue, and wool) and asthma morbidity in Nepal (n=168) of a representative sample of housewives. The prevalence of asthma morbidity, including cough, phlegm, breathlessness, wheezing and asthma were higher among those living in mud and brick houses, compared to concrete houses, and also residents living on hills and in rural areas, in contrast to those living on flat land and in urban areas.

Klaus F. Rabe et al (2004) aimed at determining international variations in severity, control, and management of asthma in children and adults by means of Asthma Insights and Reality survey. A cross-section of households in 29 countries in North America, Europe and Asia were surveyed. A standard questionnaire was administered to 7786 adults where both the objective and subjective assessment were done. The results revealed considerable loss of schooldays and workdays. The current level of asthma control worldwide falls far short of the goals for long-term management in international guidelines. The correlation between self-perceived severity of asthma and objective assessment of severity on the basis of GINA criteria was consistently poor in all areas.

Khan S, Roy A, Christopher DJ, Cherian AM (2002) conducted a study in Vellore, Tamil Nadu to find out the Prevalence of bronchial asthma among bank employees by using a simple questionnaire-based data collection. One hundred and twenty bank employees were studied in the age group 25-55 years in 4 centres of Vellore town. A one-page questionnaire in English regarding asthma and allergic symptoms was used to assess the prevalence and the details of medical care utilization by those who were asthmatics. The prevalence of self-
reported bronchial asthma was 8.3% and that of asthma-related symptoms 15.8%. There was a significant association between those who had symptoms of asthma and a positive family history of asthma. Most of the asthmatic subjects using allopathic medicines reported a poor quality of life, despite treatment. The study result showed that prevalence of asthma in Vellore town to be more than that reported in other studies carried out at different centers in India.

**Pekkanen J (1999)** examined the validity of defining asthma by reviewing population-based studies, validating Bronchial hyper responsiveness (BHR) and symptom questionnaires against asthma defined on the basis of clinical assessment. It is emphasized that a single definition of asthma will not be applicable to all studies. When the aim was to estimate relative risks, the validity of the definition depended more on its positive predictive value. Hence the study concluded that symptoms and bronchial hyperresponsiveness should usually be analyzed separately rather than combined due to poor agreement between bronchial hyperresponsiveness and clinical asthma.

**Kauffmann F (1997)** conducted the epidemiology study of genetics and environment of asthma, bronchial hyper responsiveness and atopy, phenotype issues among 1,854 samples. The criteria used in the selection of subjects with asthma and determination of asthma status of the relatives of affected sibling pair linkage were analysed; IgE level measurements, and blood eosinophilia. The study concluded that standardization of primary data and subphenotypes to be prerequisite for pooling data, which is needed in future to better understand the genetics and environmental factors of asthma.
2.1.2 Effects of teaching programme / education on asthma

Ghazi Abdulrahman Alotaibi (2015) reviewed the status of asthma control as reported in the literature and gave an overview of the effectiveness of asthma educational sessions and suggested that they could have positive impacts on patients’ adherence to treatment and control of symptoms in clinical settings. The retrieved articles since 2001 were carefully scrutinized for inclusion in this review. It focused on level of asthma control and an overview of effectiveness of asthma education programmes on controlling asthma symptoms. With all available knowledge and technology, it showed that the goal of controlling asthma is yet to be achieved. Asthma education should be integrated in treatment plan and conducted at all points of patients’ care.

Varalakshmi Manchana, Rajinder Kaur Mahal (2015) assessed the effectiveness of structured asthma educational program on self-care management of bronchial asthma among 100 samples. The findings revealed that the pre-test means between experimental (4.630) and control (4.780) groups to be not much significant. There was significant improvement in pretest (19.930; 8.84) and post test scores in the experimental group (42.32; 3.449). The posttest means between experimental (42.31) and control (21.28) supported the significant enhancement in the knowledge of the experimental group after asthma education. Hence the study emphasizes that patient education makes the disease management cost effective and more comprehensive.

Ifna H. Ejebe., Elizabeth A. Jacobs., and Lauren E. Wisk, (2014) determined the differences in asthma self-efficacy by race/ethnicity and income, and whether health status, levels of acculturation, and health care factors may
explain these differences. A secondary data analysis of asthma self-efficacy was performed using the 2009 and 2011–2012 California Health Interview Survey, in adults with asthma (n=7874). The result revealed that 69.8% of adults reported having high asthma self-efficacy. Latinos (OR 0.66; 95% CI 0.51–0.86), African-Americans (OR 0.50; 95% CI 0.29–0.83), American Indian/Alaskan Natives (OR 0.55; 95% CI 0.31–0.98) and Asian/Pacific Islanders (OR 0.34; 95% CI 0.23–0.52) were less likely to report high self-efficacy compared to Whites. Individuals with income below the federal poverty level (OR 0.56; 95% CI 0.40–0.78) were less likely to report high self-efficacy compared to higher income individuals. The relationship between income and self-efficacy was no longer significant after further adjustment for health care factors; however, the differences in race and ethnicity persisted. Receiving an asthma management plan mediated the relationship in certain subgroups.

**Swati Kambli (2012)** conducted a descriptive cross-sectional survey to determine asthma patient’s knowledge regarding diagnosis and treatment among 50 patients with bronchial asthma. The study findings revealed that majority of the patients had wrong concepts about etiology of disease management, inhaled therapy, immunotherapy and the prognosis of asthma. Hence the study concluded that sincere and sustained efforts are required to impart health education to the patients and help them to participate in the self-management plans for asthma.

**Anita Kotwani, Chhabra, VandanaTayal, Vijayan (2012)** conducted a study to investigate the quality of asthma management, knowledge about asthma and quality of life of asthma patients referred to a public tertiary care chest hospital in Delhi. Diagnosis of the patients were confirmed by symptoms and
reversible spirometry, administered AQLQ, asthma knowledge questionnaire in 50 referred patients on their first visit. The findings revealed that 60 % of them were informed about their disease, 10 % had undergone lung function tests previously. Only 44 % of them were prescribed preventive inhalers. None were provided with any educational material. Patients had poor knowledge of etiology, pathophysiology, medication, and how to assess the severity of their asthma. The mean score of AQLQ indicated a moderate degree of impairment in quality of life. Hence the study concluded that suitable interventions have to be implemented to improve asthma management according to the standard treatment guidelines in the community.

Mahendra Kumar BJ, Jimmy Jose, Kumarswamy M, Naveen MR (2011) conducted a prospective, observational hospital based study for 9 months and assessed the knowledge, attitude and medication adherence in 99 asthma patients. The findings revealed that the maximum knowledge score to be 16.83, patients scored 13.42. In attitude maximum score was 24 patients with a mean score of 17.08. Hence the study concluded that the assessment of knowledge score was better compared to attitude score.

Taha NM, Ali ZH (2011) conducted a study in Egypt to assess the effect of therapeutic Guidelines for Bronchial Asthma on Adult Patients’ knowledge, practice, compliance, and Disease Severity. The study was carried out on a convenience sample of 60 asthmatic adults between 22 and 80 years of age. Four tools were used for data collection, an Interview form, an observation check list, a Compliance assessment form and an Asthma severity assessment scale. Two thirds (66.7%) of the patients were females and from rural areas, and more than
three quarters (76.2%) were married and illiterate. Only less than one third (31%) of the patients were employed, with mostly sufficient income (59.5%). Only 14.3% of them were smokers. The duration of asthma ranged between 5 and 35 years. The study result showed that about two thirds (64.3%) of the patients’ total knowledge to be unsatisfactory before implementation of the guidelines. The decrease knowledge was regarding exercises, which was unsatisfactory among all the studied patients. The post guidelines phase showed a statistically significant improvement in patient’s knowledge (p<0.001).

Parvin IA, Ahmad SA, Islam MN (2011) conducted a cross-sectional descriptive study among chronic asthma patients attending three institutes of Dhaka to assess the level of knowledge regarding inhaler use. Convenient sampling was adopted. A total of 298 samples are included in the study out of the 231(78%) were males and 67(22%) were females. Data were collected using one semistructured questionnaire through face-to-face interview. The patients were aged from 18 to 75 years with mean age being 40.68 years. The mean monthly income of the respondents found was 8278.52 taka. Mean duration of bronchial asthma was 9.44 years. 150(50.3%) did not having any family history of asthma. Out of the total 298 respondents 103(35.8%) possessed “excellent knowledge” on inhalers. Ninety one (31.6%) had “adequate knowledge”, sixty nine (24.0%) had “poor knowledge” and thirty five (8.7%) respondents had “no knowledge” about inhalers. Males were seen having better knowledge than the females (χ2=66.582, df=3, p<0.001). Respondents with higher education possessed more knowledge than the respondents with lower education (p<0.001).
Bandana Saini et al (2011) assessed the improvements in knowledge of asthma patients after a tailored education program delivered by pharmacists and measure the sustainability of any improvements to ascertain patients’ perceptions about any changes in their knowledge. Ninety-six specially trained pharmacists recruited patients based on their risk of poor asthma control. A tailored intervention was delivered to patients based on individual needs and goals, and was conducted at three or four time points over six months. Asthma knowledge was assessed at the beginning and end of the service, and at sixth and 12 month after it had ended. Patients’ perceptions of the impact of the service on their knowledge were explored qualitatively in interviews. The 96 pharmacists recruited 570 patients, 398 (70%) finished. Asthma knowledge significantly improved as a result of the service (7.65 ± 2.36, n = 561, to 8.78 ± 2.14, n = 393). This improvement was retained for at least 12 months after the service. Patients reported how the knowledge and skills gained had led to a change in the way they managed their asthma. Hence, improvements in knowledge are achievable and sustainable if pharmacists used targeted educational interventions.

Carol A.Mancuso, Wendy sayles, John P.Allegrante (2010) determined the association between patient and clinical factors with cognitive variables and their contribution to clinical status using Knowledge, Attitude and Self-Efficacy Asthma Questionnaire (KASE) and Asthma Quality of Life Questionnaire (AQLQ). A total of 180 patients were enrolled with a mean age of 43 years and 84% were women. Knowledge was low with only 50% of patients answering half or more questions correctly (mean score = 52, possible range 0–100, higher is more knowledge). Attitude toward asthma was generally positive (mean score = 82, possible range 20–100, higher is more positive attitude) and
self-efficacy was moderate (mean score = 76, possible range 20–100, higher is more self-efficacy). In separate multivariate analyses: younger age and higher education level were associated with more knowledge (p ≤ .005); more social support, fewer depressive symptoms, and more favorable prior results of asthma care were associated with more positive attitude (p ≤ .05); and favorable prior results, more satisfaction with asthma status, not having stress-related triggers, and not having had a recent emergency department visit for asthma were associated with more self-efficacy (p ≤ .07 for all variables). In additional multivariate analyses, more knowledge (p = .0005), more positive attitude (p = .02) and more self-efficacy (p = .01) were associated with better AQLQ scores.

Barthwal MS, Katoch CD, Marwah V (2009) conducted a study in Ranchi to assess the impact of optimal Asthma Education Programme (AEP) on asthma morbidity, inhalation technique and asthma knowledge. One hundred and seventy two patients of persistent bronchial asthma aged 12 years or more, were included in the study. The results showed that there was a significant improvement in asthma morbidity and a significant decrease in patients with moderate and severe persistent asthma. Before optimal AEP, 30 (17.4%) patients had visited the hospital thrice or more due to asthma sickness, after optimal AEP only 5 (8.6%) patients made unscheduled visits only once to hospital (p<0.05). Limitation of physical activities was present in 80 (46.51%) patients before AEP which significantly reduced to 15 (8.7%) patients after optimal AEP (p<0.05%). Before AEP, inhalation technique was incorrect in 140 (81.3%) patients and after AEP none of the patients had incorrect technique (p<0.001). Only 24 (13.9%) patients had satisfactory knowledge of asthma before AEP and after AEP the
number increased significantly to 120 (69.7%) (p<0.001). This study concluded the optimal asthma education to be an integral part of asthma management which decreased asthma related morbidity, improves inhalation technique and asthma knowledge.

Rhee H, Belyea MJ, Ciurzynski S, Brasch J (2009) explored the barriers to self-management perceived by adolescents and examined the associations between barriers and psychosocial factors including knowledge, attitude and self-efficacy. This cross-sectional study included a total of 126 adolescents with asthma (13-20 years) representing diverse race/ethnicity groups with a wide range of socioeconomic status. Self-reported data were analyzed using descriptive statistics, factor analysis and hierarchical regression. The most frequently endorsed barrier (63%) was adolescents' unwillingness to give up "the things the doctors say I have to give up," followed by difficulty in remembering to take care of their asthma (53%), and then "trying to forget" that they have asthma (50%). Psychosocial factors accounted for 32% of the variance in total barrier perceptions. Factor analysis revealed barriers in four domains including negativity toward providers and the medication regimen, cognitive difficulty, peer/family influence and denial.

Knight D (2005) identified the beliefs and self-care practices of adolescents with asthma in a private high school, where the incidence of asthma is nearly 20%. Analysis of the data from 10 individual audiotaped interviews, using a semi structured questionnaire, yielded major themes of knowledge acquisition, self-efficacy, and social support that are associated with behaviors that control asthma with better outcomes. Specifically, the greatest knowledge acquisition and
symptom recognition were associated with exposure to multiple educators, especially school-based programs. High self-efficacy was facilitated through positive experiences teens recognized that they had fewer asthma events and severity once they were in better physical condition, on preventive medicines, and/or used trigger avoidance success. Social support for teens was very helpful and included parents, family, friends, coaches, teachers, and healthcare providers. Implications for practice include the need for adolescent asthma-awareness training, as higher awareness of asthma conditions and triggers may provide peer support for teens with asthma in school.

Ellison-Loschmann et al (2004) observed regional patterns of asthma hospitalizations in Maori versus non-Maori areas. The rate of asthma hospitalization was higher for Maori than for non-Maori people in two different age groups: 15-34 years RR=1.31; and 35-74 years RR=2.97. Moreover, the differences were higher in rural areas (RR=1.34 and 3.13) than in urban areas (RR=1.22 and 2.79).

Prasad R, Gupta R, Verma SK (2003) conducted a study in Lucknow to assess the Perception of Patients about Bronchial Asthma. In all, 135 consecutive patients of bronchial asthma attending in and outpatient services of Department of TB and Chest diseases were interviewed using a questionnaire. The mean age of patients was 27.7±3.1 years. Mean duration of illness of patients was 13.4±3.5 years. The ratio of urban to rural population was 2.6. Majority of patients i.e. 81(60%) belonged to middle class, 42(31.1%) patients to lower class and 12(8.9%) patients to upper class. One hundred and seven patients (79.3%) showed ignorance about the aetiology of asthma. Only 6 (4.4%) patients were aware about
the various medications prescribed for asthma. As many as 52 (38.5%) patients were aware of allergy test and 39 (28.9%) about immunotherapy. None of the patients knew about peak flow meter, lung function tests as tools for monitoring of their disease. Most of the patients i.e. 98(72.6%) were from urban population, yet were ignorant about their disease. A large number of (95.6%) patients were not having any knowledge about the types of treatment for asthma. The study revealed that an average asthmatic patient was generally ignorant about his ailment and had misconceptions.

2.1.3 Research related to asthma control

Abdulaziz A, Binsaeed (2015) explored the determinants of uncontrolled asthma in Saudi Arabia among adults with asthma patients attending three pulmonary primary care clinics. The results revealed that proportion of patients with uncontrolled asthma was 68.1% (177/260). Daily tobacco smoking or monthly household income less than 15,000 Saudi Arabian Riyals were associated with a 4.6 (95% confidence interval [CI] =1.3-16.4) and 3.4 (95% CI=1.8-6.6) times increase in the odds of having uncontrolled asthma. Patients with less than a graduate degree (odds ratio [OR]=3.1; 95% CI=1.0-9.5) or patients who were unemployed, disabled, or too ill to work (OR=3.1; 95% CI=1.4-6.9) had poorer asthma control. Having heartburn during the past 4 weeks decreased the odds of asthma control by 2.5 (95% CI=1.3-4.9), and having chronic sinusitis during the past 4 weeks decreased the odds of asthma control by 2.0 (95% CI=1.0-4.0) times. Being female (OR=2.0; 95% CI=1.0-4.0) or ≥35 years of age (OR=2.0; 95% CI=1.0-3.9) was also associated with having uncontrolled asthma. Hence it was suggested that most respondents had uncontrolled asthma. Less modifiable socio-demographic factors (for example, income, education, occupation, gender, and
age) significantly increased the odds of having uncontrolled asthma. However, modifiable risk factors such as tobacco smoking and clinical factors such as heartburn and chronic sinusitis could also be targeted for intervention.

Wenping Zhang, Xianliang Chen, Lijun Ma, Jizhen Wu, Limin Zhao, Hongyan Kuang et al (2014) estimated the prevalence of bronchial asthma, asthma treatment assessment, and the control level among asthma patients in Henan Province, China 109 cities and districts in Henan province using a multistage stratified cluster random sampling method. A total of 500 households from each city and district were chosen. Approximately 20,000 residents from a total of 5,000 households were randomly selected to answer a questionnaire recommended by the China Asthma Alliance. Asthma patients were asked to answer a detailed questionnaire using the symptom-based guidelines to assess the levels of disease control. The overall prevalence of asthma was 0.73% ± 0.12%. Urban and rural residents had asthma prevalence rates of 1.1% ± 0.23% (88/7,924) and 0.48% ± 0.12% (57/11,792), respectively. Among the asthma patients, only 33.8% (52) received regular medication, 25% (13) used oral glucocorticoids, and 71.1% (37) used oral theophylline. The classified control levels of patients were as follows: 33.1% controlled, 49.7% partially controlled, and 17.2% uncontrolled. A total of 38.5% and 27.5% of regularly and irregularly treated asthma patients reached controlled level, respectively. The two groups significantly differed in asthma control level. Hence the study concluded that asthma prevalence is low in Henan Province, China.
Victor AniediUmoh, John U. Ekott, MfonEkwere, Obeten Ekpo (2011) evaluated the current level of asthma control as reported by the patients, which may be a reflection of adherence to guidelines. The Asthma Control Test (ACT) was administered on the patients and data were also obtained for medication use and disease monitoring. A total ACT score of <20 signified poor control. The findings revealed that out of 78 patients, 70 completed the survey (89.7%). The average age of patients was 46 ± 18 years (mean ± standard deviation). The average ACT score was 14.4 ± 4.8; 82.9% of patients had poor control. 57.1% of patients who perceived their asthma to be well or totally controlled were objectively assessed to be poorly controlled. More than half of the patients used short acting E2 agonist alone and only 20% used inhaled corticosteroids for maintenance therapy. Thirty eight patients made unscheduled emergency room visits in the past 12 months and 68.8% could not use their inhaler devises well. Emergency room visits (odds ratio [OR] 9.5) and poor inhaler technique (OR 18.9) was independent predictors of poor asthma control. Hence the current level of asthma control among patients in Uyo is below guideline recommendations. Management of patients did not appear to follow guideline recommendations and patients had tendency to over-estimate their disease control.

Hatice S Zahran, Cathy M. Bailey., Xiaoting Qin., Jeanne E. Moorman (2014) conducted a study to assess the level of asthma control and identify related risk factors among persons with current asthma. Using the 2006 to 2010 BRFSS child and adult Asthma Call-back Survey, asthma control was classified as well-controlled or uncontrolled (not-well-controlled or very-poorly-controlled) using three impairment measures: daytime symptoms, nighttime
symptoms, and taking short-acting β2-agonists for symptom control. The result revealed that fifty percent of adults and 38.4% of children with current asthma had uncontrolled asthma. About 63% of children and 53% of adults with uncontrolled asthma were on long-term asthma control medications. Among children, uncontrolled asthma was significantly associated with less than 5 years, having an annual household income < $15,000, and reporting cost as barriers to medical care. Among adults, it was significantly associated with being 45 years or older, having annual household income of < $25,000, being “other” race, having an education lesser than a 4-year college degree, being a current or former smoker, reporting cost as barriers, being obese, and having chronic obstructive pulmonary disease or depression. Hence, identifying and targeting modifiable predictors of uncontrolled asthma (low educational attainment, low income, cigarette smoking, and co-morbid conditions including obesity and depression) could improve asthma control.

Marci Clark, PharmD; Susan Martin, MSPH; Henrik Svedsater, Peter, Dale, Loretta Jacques (2014) evaluated the measurement properties of an asthma symptom and rescue medication use (ASRMU) diary for clinical trials involving asthma patients aged ≥12 years. Interviews with 35 patients were conducted to confirm the importance of key concepts in the ASRMU diary. Symptom and rescue medication use scores were converted to symptom-free days (SFD) and rescue-free days (RFD). The result revealed that patient interviews supported content validity for the ASRMU diary. Test-retest reliability was acceptable for SFD (ICC:0.70–0.75), but varied for RFD (ICC:0.58–0.78). Paper-and-pencil and eDiary modes of administration were equivalent (SFD, ICC=0.84; RFD, ICC=0.70). ICS/LABA had the largest percentage of SFD and RFD,
followed by monotherapy, and then placebo. MIDs were 7.7–14.7% for SFD and 8.4–15.6% for RFD. The ASRMU diary captured the disease-specific concepts of greatest importance to asthma patients and provided important information for asthma diagnosis and treatment evaluation.

David Van Sickle, Sheryl Magzamen, Shaun Truelove, Teresa Morrison (2013) conducted an open group, short term pilot study on the impact of asthma control. An investigational electronic medication sensor attached to each participant’s inhaler and monitored a 4 months’ use of inhaled, short-acting bronchodilators. The asthma control test was used to assess asthma control at entry and monthly thereafter. The result revealed that among 30 subjects, 29 provided complete asthma control information, mean ACT score were 17.6 at entry and 18.4 at completion of the first month. However, after the participants began receiving email reports an online information about their inhaler use, mean ACT scores increased 1.40 points for each subsequent study month. Participants reported increased awareness and understanding of asthma patterns, level of control, bronchodilator use and triggers, decline in day-to-day symptoms and improved preventive practices.

Siroux V et al (2012) assessed the relationship of asthma control by combining epidemiological survey questions and lung function to Health related Quality of Life among 584 individuals without asthma and 498 with asthma who participated in the follow-up of the Epidemiological study on Genetics and Environment of Asthma (EGEA). The study findings revealed that adjusted mean total AQLQ score decreased by 0.5 points for each asthma control steps 6.4, 5.9
and 5.4 for controlled, partly controlled and uncontrolled asthma respectively with 
p<0.0001.

Lisspers K, Ställberg B, Hasselgren M, Johansson G, Svärdsudd K (2010) determined the effects on patients knowledge and asthma control for patients attending primary care centers. A cross-sectional survey at 42 primary health care centers were randomly selected according to organisation of asthma care, 14 with complete, 14 with incomplete and 14 with no asthma clinic according to national criteria. 1,477 randomly selected patients 15-45 years received two questionnaires. Outcomes were: patients’ knowledge of asthma; asthma control; and quality of life. Patients attending primary health care centers with asthma clinics reported more knowledge of asthma but similar levels of asthma control and quality of life. Patients who reported they had visited the asthma nurse during the last year had more knowledge but similar asthma control and quality of life compared to patients who reported they had not. However, with more time allocated for the nurse, 44% achieved asthma control compared with 27% at asthma clinics with less time (p<0.003). Having an asthma clinic at a primary health care center improved asthma patients’ knowledge of the disease; and better asthma control is achieved if the nurse is allocated more time.

Andrew G. Weinstein, Wilmington, Jean-Philippe, Newark (2010) identified the asthma patient adherence status and reasons for non adherence of asthma management among 518 adults with intermittent and persistent type of asthma. They completed Personalized Assessment and Control Tool. The result revealed that 350 (67.6%) of them reported taking one or more anti-inflammatory drugs. During a period of 4 weeks, 48.3 % reported having daily symptoms and
37.6% were using metered dose inhalers daily, symptoms during distressing emotional states was significant at P=.003, lack of comprehension of care instructions (not understanding the use of peak flow meter, prescribed medications, when to use medicines) was at p=0.002 and quality of life disruption was at p <0.001.

Schatz M, Mosen DM, Kosinski M, Vollmer WM, Magid DJ, O'Connor E, Zeiger RS (2007) quantitatively addressed the relationship between asthma-specific quality of life and asthma control as assessed by validated tools. Questionnaires were completed at home by a random sample of 542 adult asthmatic patients. The correlations of the two asthma control tools (Asthma Control Test and Asthma Therapy Assessment Questionnaire) with the quality of life tool (mini-Asthma Quality of Life Questionnaire) were strongest with the symptoms and activity domains (r = 0.63-0.77); lower with the emotions domain (r = 0.57-0.64); and lowest with the environment domain (r = 0.38-0.43). Asthma control tools reflect the symptoms and activity themes of asthma quality of life well, but reflect poorly the environmental domain.

Lisspers K, Ställberg B, Hasselgren M, Johansson G, Svärdsudd K (2007) determined the quality of life and asthma control in primary care. A total of 1,477 patients 15 to 45 years of age received questionnaires regarding asthma control (77% responded) and quality of life, Mini Asthma Quality of Life Questionnaire (Mini AQLQ), (74% responded). Patients using short-acting beta-agonists more than twice in the previous week had clinically significant lower Mini AQLQ scores (5.17 versus 5.91). This finding was consistent for night awakenings during the previous week (4.42 versus 5.86), courses of oral
corticosteroids (4.82 versus 5.69), and reported emergency consultations during the last 6 months (4.85 versus 5.71). Good asthma control was associated with better quality of life in asthma patients in primary care.

2.1.4 Research related to Quality of life among asthmatics

Heethal et al (2014) conducted a survey to assess the quality of life in patients with bronchial asthma in an outpatient clinic, Malaysia. A total of 40 asthmatic patients were administered the mini asthma quality of life questionnaire developed by Elizabeth Juniper. The result revealed that the mean age of the patient to be 32.7± 15 yrs. 70 % of the patients were females, 60 % had severe impairment in the quality of life. In the symptoms, emotional function and environmental stimuli domains 70 %, 65% and 75% of the patients respectively had severe impairment in the quality of life, whereas in the activity domain it was only 27.5 %.Hence it was concluded that most of the patients had severe impairment in the quality of life.

Kligler B, Homel P, Blank AE, Kenney J, Levenson H, Merrell W (2011) tested the effectiveness of an integrated medicine approach to the management of asthma compared to standard clinical care. The intervention consisted of six group sessions on the use of nutritional manipulation, yoga techniques, and journaling. Participants also received nutritional supplements: fish oil, vitamin C, and a standardized hops extract. The control group received usual care. Primary outcome measures were the Asthma Quality of Life Questionnaire (AQLQ), The Medical Outcomes Study Short Form-12 (SF-12), and standard pulmonary function tests (PFTs). In total, 154 patients were randomized and included in the intention-to-treat analysis (77 control, 77 treatment). The treatment
participants showed greater improvement than controls at 6 months for the AQLQ total score (P<.001) and for three subscales, Activity (P< .001), Symptoms (P= .02), and Emotion (P<.001). Treatment participants also showed greater improvement than controls on three of the SF-12 subscales, Physical functioning (P=.003); Role limitations, Physical (P< .001); and Social functioning (P= 0.03), as well as in the aggregate scores for Physical and Mental health (P= .003 and .02, respectively). There was no change in PFTs in either group. Hence a low-cost group-oriented integrated medicine intervention would lead to significant improvement in QOL in adults with asthma.

Sunil K. Chhabra, Pankaj Chhabra (2011) conducted a study to identify the inter-relationship between gender, perception of dyspnea, asthma control and Health related Quality of life. A total of 85 patients attending OPD underwent spirometry and were administered the following instruments to measure asthma control, HRQOL and dyspnoea : (a) Asthma control questionnaire (ACQ), (b) Asthma Quality of Life questionnaire (AQLQ), (c) Baseline dyspnoea index (BDI) questionnaire and Oxygen Cost Diagram (OCD). The result revealed that overall, male patients had greater airways obstruction but reported similar level of asthma control as that of females. Among patients with mild persistent asthma, females had a poorer level of control. The BDI and the OCD scores were significantly lower in female patients indicating greater dyspnoea and they also had a poorer quality of life especially in the symptoms and emotional domains of the AQLQ. After adjusting for the severity of airways obstruction in multivariate analysis, female gender and a poorer quality of life were found to be independent predictors of increased perception of dyspnoea. Hence, female patients with asthma are likely to have a greater perception of dyspnoea, report a poorer control
and have a poorer quality of life as compared to males. Female gender and a poorer quality of life are independent predictors of increased perception of dyspnoea in asthmatics.

**Porsbjerg C, Rasmussen L, Nolte H, Backer V (2007)** described the relationship between AHR and quality of life in asthma patients and to determine the impact of the severity of asthma on this relationship. Data from 691 asthma patients were analyzed to describe the relationship between the impact of AHR to methacholine (cumulative dose of methacholine required to provoke a 20% decrease in forced expiratory volume in 1 second, ≤ 8 micromol) on quality of life (measured by the Asthma Quality of Life Questionnaire) of asthma patients in relation to the severity of asthma (according to the Global Initiative for Asthma guidelines). Asthma patients with AHR had more severe asthma and a poorer quality of life compared with asthma patients without AHR. Furthermore, the quality of life decreased with increasing severity of asthma. However, regression analysis showed an independent association between both the presence of AHR and the severity of asthma and quality of life, as well as an interaction between the effects of these 2 factors. Finally, subgroup analysis showed the impact of AHR on the quality of life to be significant only clinically in moderate to severe asthma but not in mild asthma. AHR has a negative impact on the quality of life of asthma patients and is partly independent of the severity of asthma.

**Naleway AL, Vollmer WM, Frazier EA, O’Connor E, Magid DJ (2006)** identified the gender differences in asthma management and quality of life. Women were more likely to regularly use a peak flow meter, have a regular clinician for their asthma care, and to have a written asthma management plan. No
gender differences in self-reported asthma severity were observed, and men and women ranked similarly in their knowledge and confidence in their self-management skills similarly. Women reported significantly worse health status than men, but the differences observed were small and were attenuated after adjusting for socioeconomic status, smoking, body mass index, and comorbid illness.

**Lavoie KL, Bacon SL, Labrecque M, Cartier A, Ditto B (2006)** assessed BMI in a Canadian sample of 382 adult asthma outpatients, and evaluated associations between BMI and levels of asthma severity, asthma control, and asthma-related quality of life. Demographic and medical history interviews were held on the day of their visit to the clinic. Patients' self-reported height and weight were used to calculate BMI (kg/m²). Asthma severity was classified according the GINA (2002) guidelines. Patients completed the Asthma Control (ACQ) and Asthma Quality of Life (AQLQ) Questionnaires and underwent standard pulmonary testing (spirometry). A total of 139 (36%) patients had a normal BMI; 149 (39%) patients were overweight; and 94 (25%) patients were obese. There was no relationship between BMI and asthma severity when controlled for age and sex. Patients with higher BMI scores had higher ACQ and lower AQLQ scores, independent of age, sex and asthma severity. Results identified higher BMI and obesity as potential behavioral factors that worsened asthma control and quality of life, but not asthma severity, and suggested important avenues for asthma management and control initiatives.

stable patients with asthma age \( \geq 60 \) years and 40 age-matched comparison subjects were examined. The patients with long-standing asthma (duration \( \geq 8 \) years) had lower quality-of-life scores than those with recent-onset asthma (duration \( < 8 \) years). In multivariate linear regression analysis with adjustment for age, gender duration of disease, and level of bronchial hyper reactivity, worse quality of life was predicted by anxiety, depression, and asthma severity scores. In elderly patients with long-standing asthma, disease severity significantly impairs quality of life. Impaired quality of life in these patients may be partly related to psychological status indicators.

2.1.5 Research related to effect of yoga on Quality of life

Khue Ai Thi Hoang, Hung Manh (2015) conducted a study to assess the effects of pranayama yoga practice on lung functions in patients with bronchial diseases. This is a controlled trial study. Intervention group practiced ujjayi, bhrastrika, kapalabathi, anulomaviloma, bhramari pranayama and meditation and were asked to practice in home for another three months. After three months of yoga practice, breath indicators such as FVC, FEV\(_1\), FEV\(_1\)/FVC, PEFR of intervention group significantly improved with p value \(<.01\) to \(.001\) in comparison with the previous three months of the control group. Hence, practicing pranayama yoga is beneficial to patients with bronchial asthma.

Shruti Agnihotri, Surya Kant, Mishra, Prashant Mani Tripathi (2015) explored the possible benefits of yoga in asthma patients through the systematic analysis of six randomized controlled trial. The summary of results inferred that asthma cannot be cured but medicines and lifestyle changes can help to control these symptoms. Yoga is one of the methods that can help to increase muscular
efficiency and reduce perceived exertion and has profound effect on the autonomic nervous system, improves lung function, decreases respiratory rate, increases vital capacity and breath holding time.

Cramer H, Lauche R, Dobos G (2014) investigated the bibliometric analysis of therapeutic value of yoga interventions. All RCTs of yoga were eligible. Published between 1975 and 2014, a total of 366 papers were included, reporting 312 RCTs from 23 different countries with 22,548 participants. The median study sample size was 59 (range 8-410, interquartile range = 31, 93). Two hundred sixty-four RCTs (84.6%) were conducted with adults, 105 (33.7%) with older adults and 31 (9.9%) with children. Eighty-four RCTs (26.9%) were conducted with healthy participants. Other trials enrolled patients with one of 63 varied medical conditions; the most common being breast cancer (17 RCTs, 5.4%), depression (14 RCTs, 4.5%), asthma (14 RCTs, 4.5%) and type 2 diabetes mellitus (13 RCTs, 4.2%). Whilst 119 RCTs (38.1%) did not define the style of yoga used, 35 RCTs (11.2%) used Hatha yoga and 30 RCTs (9.6%) yoga breathing. The remaining 128 RCTs (41.0%) used 46 varied yoga styles, with a median intervention length of 9 weeks (range 1 day to 1 year; interquartile range = 5, 12). Two hundred and forty-four RCTs (78.2%) used yoga postures, 232 RCTs (74.4%) used breath control, 153 RCTs (49.0%) used meditation and 32 RCTs (10.3%) used philosophy lectures. One hundred and seventy-four RCTs (55.6%) compared yoga with no specific treatment; 21 varied control interventions were used in the remaining RCTs.

ShrutiAgnihotri, Surya Kant, Santosh Kumar, Ranjeet K Mishra, and Satyendra K Mishra (2014) evaluated the effect of yoga on biochemical profile
of 276 patients of mild to moderate asthma ($\text{FEV}_1 > 60\%$) aged between 12 to 60 years recruited from the Department of Pulmonary Medicine, King George's Medical University, U.P., Lucknow, India. They were randomly divided into two groups: Yoga group (with standard medical treatment and yogic intervention) and control group as standard medical treatment (without yogic intervention). Biochemical assessment was carried out at baseline and after 6 months of the study period. Yoga group got significantly better improvement in biochemical variables than the control group. Result showed that yoga could be practiced as adjuvant therapy with standard inhalation therapy for better outcome of asthma.

**Cramer H, Posadzki P, Dobos G, Langhorst J (2014)** systematically assessed and meta-analyzed the data on efficacy and safety of yoga in alleviating asthma. Fourteen randomized controlled trials with 824 patients were included. Evidence for effects of yoga compared with usual care was found for asthma control (RR, 10.64; 95% CI, 1.98 to 57.19; $P = .006$), asthma symptoms (SMD, -0.37; 95% CI, -0.55 to -0.19; $P < .001$), quality of life (SMD, 0.86; 95% CI, 0.39 to 1.33; $P < .001$), peak expiratory flow rate (SMD, 0.49; 95% CI, 0.32 to 0.67; $P < .001$), and ratio of forced expiratory volume in 1 second to forced vital capacity (SMD, 0.50; 95% CI, 0.24 to 0.75; $P < .001$); evidence for effects of yoga compared with psychological interventions was found for quality of life (SMD, 0.61; 95% CI, 0.22 to 0.99; $P = .002$) and peak expiratory flow rate (SMD, 2.87; 95% CI, 0.14 to 5.60; $P = .04$). No evidence for effects of yoga compared with sham yoga or breathing exercises was revealed. No effect was robust against all potential sources of bias. Yoga was not associated with serious adverse events. It can be considered as an ancillary intervention instead of routine intervention for asthma patients interested in complementary interventions.
Akira Yamasaki (2014) evaluated the sleep quality with the level of asthma control and asthma related quality of life and pulmonary function test. Fifty patients with asthma were enrolled in this study. Sleep quality was assessed by wristwatch-type actigraphy, asthma control by asthma control questionnaire, and quality of life by asthma Quality of life questionnaire. The result revealed that the total sleep time was 387.2 minutes, duration of awakening after sleep onset (WASO) was 55.8 minutes, sleep efficiency was 87.01%, and average ACQ was 0.36. Neither sleep efficiency nor WASO correlated with respiratory functions, ACQ scores, or AQLQ scores.

Candy Sodhi, Sheena Singh, Amit Bery (2014) assessed the effect of yoga on quality of life among 120 asthma patients in the age group of 17 to 50 years were randomized into yoga (Group A) and control (Group B) group. Group A patients practiced yoga breathing exercises for 8 weeks. Asthma Quality of life Questionnaire (AQLQ) and daily record was used to assess quality of life, number and severity of asthmatic attack, and the dosage of medication required at baseline and at 8 weeks. The result revealed that group A patients showed a statistically significant improvement in symptoms, activity and environmental domains of AQLQ at 8 weeks (p<0.01) and significant reduction in number and severity of attacks, and the dosage of medications required at 4 and 8 weeks compared to the baseline.

Chitharanjan Rao, Avinash Kadam, Aarti Jagannathan, Babina, Raghavendra Rao, Nagendra (2014) tested the efficacy of a one month in-patient naturopathy and yoga programme for patients with asthma. Retrospective data of 159 bronchial asthma patients was analyzed for FVC, FEV₁, MVV and
PEFR on admission, 11\textsuperscript{th} day, on discharge and once in three months for three years. The result revealed significant increase in FVC, FEV\textsubscript{1}, MVV and PEFR from admission till the date of discharge and also in the follow-up at 36\textsuperscript{th} month (p<0.0035).

**Harika, Rasool Sayyad, Premkumar Yadav, Sanjay Sah, Sanjit Kumar Kar** (2014) evaluated the pulmonary function test before and after yoga practice. The following asanas were practiced for the patient namely bhujangasana, Suptavajrasana, Shavasana, Ushtrasana, Kaphalabathi. A total of 40 subjects were assessed after the period of 8 weeks. The results revealed that it is statistically significant in observed value FVC and FEV\textsubscript{1} after 8\textsuperscript{th} week of yoga practice. Hence, yoga is useful for improving pulmonary function tests in asthma patients.

**Holger Cramer, Paul Posadzki, Gustav Dobos, Jost Langhorst** (2014) systematically assessed and meta-analyzed the available data on efficacy and safety of yoga in alleviating asthma. Fourteen randomized controlled trials with 824 patients were included. Evidence for effects of yoga compared with usual care was found for asthma control (RR, 10.64; 95\% CI, 1.98 to 57.19; P = .006), asthma symptoms (SMD, −0.37; 95\% CI, −0.55 to −0.19; P < .001), quality of life (SMD, 0.86; 95\% CI, 0.39 to 1.33; P < .001), peak expiratory flow rate (SMD, 0.49; 95\% CI, 0.32 to 0.67; P < .001), and ratio of forced expiratory volume in 1 second to forced vital capacity (SMD, 0.50; 95\% CI, 0.24 to 0.75; P < .001); evidence for effects of yoga compared with psychological interventions was found for quality of life (SMD, 0.61; 95\% CI, 0.22 to 0.99; P = .002) and peak
expiratory flow rate (SMD, 2.87; 95% CI, 0.14 to 5.60; \( P = .04 \)). No evidence for effects of yoga compared with sham yoga or breathing exercises was revealed.

**Sodhi C, Singh S, Bery A (2014)** conducted the randomized trial on the effect of yoga on quality of life in patients with bronchial asthma. Yoga which is used as an adjunct treatment for bronchial asthma is gaining popularity throughout the world. 120 non-smoking male and female patients of asthma in the age group of 17-50 years were randomized into two groups i.e. Group A (Yoga group) and Group B (control group). All patients remained on their prescribed medication, but Group A patients practiced yoga breathing exercises for 8 weeks. Asthma Quality of Life Questionnaire (AQLQ) and diary record was used to assess quality of life, number and severity of asthmatic attacks, and the dosage of the medication required at baseline and after 8 weeks. Group A subjects showed a statistically significant improvement in "symptoms", "activities" and "environmental" domains of AQLQ at 8 weeks (p<0.01) and significant reduction in daily number and severity of attacks, and the dosage of medication required at 4 and 8 weeks (p<0.01) compared to the baseline. Yoga breathing exercises used adjunctively with standard pharmacological treatment significantly improved quality of life in patients with bronchial asthma.

**Surya Kant, ShrutiAgnihotri (2013)** conducted a study on 276 subjects with mild or moderate bronchial asthma who were allocated randomly to either the yoga (n=121) and the control group (n=120) in King George’s medical university, U.P. and observed the biochemical changes. The yoga group received interventions based on asanas, pranayama and meditation in addition to the standard medical treatment and both the groups were assessed at 0\(^{th}\), 3\(^{rd}\) and 6\(^{th}\)
month. The result revealed that there was a significant improvement in asthma symptom score and Asthma Quality of Life scores in yoga group at 3\textsuperscript{rd} month (p value 0.004) & 6\textsuperscript{th} month (p<0.001) in total AQOL score and rescue medication use had a significant decrease in comparison to control group. There was a significant difference in hemoglobin, eosinophil, monocytes and TLCS.

**Manoj Sharma, Taj Haider, Partha P. Bose (2013)** conducted a systematic review of studies meeting the following criteria is presented:  (a) be published in the English language;  (b) included in CINAHL, Medline, or Alt Health Watch;  (c) between the years 1972 and 2012;  (d) include yoga as an intervention;  (e) use any quantitative study design; and  (f) measures one of the following outcomes: forced expiratory volume in 1 second, peak expiratory flow rate, airway resistance, or Asthma Quality of Life Questionnaire score. Of the 15 studies systematically analyzed, 10 documented significant improvement because of yoga. Limitations included lack of a theory-based approach, self-reporting errors, and intervention adherence issues.

**Prem, Sahoo, Adhikari (2013)** compared two breathing exercises (Buteyko and pranayama) with a control group in patients with asthma. 120 patient were randomized to three groups through block randomization at OPD. Subjects in the Buteyko and pranayama groups were trained for 3-5 days and instructed to practice the exercises for 15 minutes twice daily, and for three months duration. The control group underwent routine pharmacological management during the study period. The baseline characteristics were similar in all three groups. Post intervention, the Buteyko group showed better trends of improvement (mean (95% confidence interval), P-value) in total Asthma Quality
of Life Questionnaire score than the pranayama (0.47 (-0.008-0.95), P = 0.056) and control groups (0.97 (0.48-1.46), P = 0.0001). In comparison between the pranayama and control groups, pranayama showed significant improvement (0.50 (0.01-0.98), P = 0.042) in total Asthma Quality of Life Questionnaire score.

Aggarwal, Khatri, Siddiqui, Hasan, Deepankar, Kulshreshtha, Agarwal (2013) conducted a study in the department of physiology at S.N.M.C. Agra. 50 cases of bronchial asthma practicing pranayama formed the study group and 50 in the control group. The cases were instructed by trained yoga instructor to perform anulomavilom and kapalbhati pranayama regularly for 3 months and then dynamic lung function parameter FVC, FEV1, FEV1/FVC, PEFR was recorded before and after pranayama. On comparing both the groups, all the parameters showed improvement after first, second and third month of pranayama in the study group but not in the control group.

Benjamin Kigler, Melissa Dane Mckee, Esther Sackett, HannieLevenson, Jeanne Kenney, AlsonKarasz (2012) identified a set of characteristics that predict a positive response to an integrated/lifestyle approach to asthma that incorporates Journaling, yoga breathing techniques, and nutritional supplementation. Qualitative analysis was done among 12 respondents and 8 non-responders using Asthma Quality of Life scale. Responders demonstrated an attitude of change as challenge, a view of themselves as independent and leaders, ability to accept one’s illness in connection with complementary and alternative medicine interventions, sense of commitment. Non responders were more often anxious in their relationship to asthma, lack of philosophy of CAM interventions.
Singh S, Soni R, Singh KP, Tandon OP (2012) determined the pulmonary functions and diffusion capacity in patients of bronchial asthma before and after yogic intervention of 2 months. Sixty stable asthmatic-patients were randomized into two groups i.e group 1 (Yoga training group) and group 2 (control group). Each group included thirty patients. Lung functions were recorded on all patients at baseline, and then after two months. Group 1 subjects showed a statistically significant improvement (P<0.001) in Transfer factor of the lung for carbon monoxide (TLCO), forced vital capacity (FVC), forced expiratory volume in 1st sec (FEV1), peak expiratory flow rate (PEFR), maximum voluntary ventilation (MVV) and slow vital capacity (SVC) after yoga practice. Quality of life also increased significantly. It was concluded that pranayama & yoga breathing and stretching postures are used to increase respiratory stamina, relax the chest muscles, expand the lungs, raise energy levels, and calm the body.

Bidwell AJ, Yazel B, Davin D, Fairchild TJ, Kanaley JA (2012) assessed whether 10 weeks of yoga training can improve quality of life and heart rate variability (HRV) among 19 women. They were randomly assigned to a yoga group or a control group for a 10-week intervention. All subjects answered the St. George's Respiratory Questionnaire (SGRQ) to assess quality of life and performed an isometric handgrip exercise test to assess HRV. Based on the SGRQ, significant improvements (45%, p < 0.05) in quality of life were observed with the yoga training, while no changes were found in the control group. Resting hemodynamic measures improved significantly in the yoga group compared to the control group (p < 0.05). The yoga group decreased parasympathetic modulation (HFnu [normalized units]) pre- to post intervention (0.45 ± 0.60 to 0.35 ± 0.06 nu,
p<0.05, respectively) in response to the isometric forearm exercise (IFE), whereas the control group did not change.

Posadzki P, Ernst E (2011) assessed the effectiveness of yoga as a treatment option for asthma. Seven databases were searched from their inception to October 2010. Six RCTs and one NRCT met the inclusion criteria, if they investigated any type of yoga in patients with asthma. Three RCTs and one NRCT suggested that yoga leads to a significantly greater reduction in spirometric measures, airway hyperresponsivity, dose of histamine needed to provoke a 20% reduction in forced expiratory volume in the first second, weekly number of asthma attacks, and need for drug treatment. Three RCTs showed no positive effects compared to various control interventions.

Amy J.Bidwell, Beth Yazel, David Davin, Timothy J.Fairchild, Jill A.Kanaley (2011) assessed whether 10 weeks of yoga training improved quality of life and heart rate variability in patients with asthma. 19 females were randomly assigned to a yoga or control group for 10 weeks and all the subjects were asked to answer St.George’s Respiratory Questionnaire and performed isometric handgrip exercise test. The result revealed that there was a significant improvements (p<0.05) in quality of life with the yoga training, while no changes were found in the control group. Additionally, yoga group increased sympathetic pre 0.47± 0.07 to post 0.60 ±0.07 and sympathovagal modulation pre 4.61 ±0.39 to post 5.31± 0.44 at p<0.05 during IFE with no change in the control group. Hence, yoga training improved quality of life in women with mild –to-moderate asthma and resulted in decreased parasympathetic and increased sympathetic modulation in response to an IFE.
Grammatopoulou (2011) conducted a study on effectiveness of yoga on asthma control and quality of life among 40 mild to moderate asthma patients at Outpatient department. The intervention was given for one hour at two phases. In phase 1 the patients were educated about the normal breathing pattern, exacerbations, self-management plans and breathing techniques and at the second phase they were instructed to maintain these techniques during leisure time activities. The result revealed that there was significant improvement in asthma control and Quality of life after the 6 months of intervention.

Demeke Mekonnen, Andualem, Mossie (2010) determined the effect of yoga on patterns of clinical features, peak expiratory flow rates and use of drugs among 24 volunteer asthmatic patients who received support at missionary of charity and were grouped into yoga and control groups. The yoga group was supervised for four weeks, taking yoga exercise daily for 50 minutes and peak expiratory flow rate and vital signs were measured in both groups. The results revealed that yoga group showed 66.7 % reduction in the use of salbutamol puff and 58.3 % salbutamol tablets. There was a 10 % reduction in the PEFR in the yoga group while only 2% in the control group. There was statistically significant reduction in day and night asthma attacks, improvement in the peak expiratory flow rate in the yoga group.

Nagarathna, Nagendra, Seethalakshmi (2009) determined the effectiveness of PEFR after yoga therapy. Daily PEFR recorded in 161 patients of bronchial asthma after yoga therapy of one hour daily for 15 days showed significant trend towards improvement. Yoga is found to be an important non pharmacological approach.
Murthy, Rao (2009) evaluated the efficacy of non-pharmacological approach of naturopathy and yoga in the management of bronchial asthma. A total of 60 patients were treated at Jindal Institute for Nature cure, Bangalore. The yoga practice consisted of yogasana, pranayama, kriyas and yoganidra for the period of 21 days. The result revealed that mean FVC values increased from 1.74 at admission to 1.82 at discharge, FEV₁ from 1.35 to 1.54 and the mean FEV₁/FVC also increased from 75.78 to 78.17, but was statistically significant marginally (p=0.09). The mean PEFR values increased from 238.83 to 320.75, which was statistically highly significant. Two third of the patients did not have to use any other medication as observed at different time intervals during the period of one year. Further, most of the parameters especially PEFR did not vary at different periods during follow up.

Ramprabhu et al (2009) showed in a study of 57 asthma patients that significant changes were found in FEV₁ and PEFR in the yogagroup after the regular practice of yoga for 8 weeks of the study period from the baseline. This study supported the efficacy of yoga in the management of bronchial asthma as the quality of life improved significantly in the yoga group too.

Saxena T, Saxena M (2009) determined the effect of breathing exercises (pranayama) in 50 patients with bronchial asthma of mild to moderate severity . Patients were allocated to two groups: group A and group B (control group). Patients in group A were treated with breathing exercises (deep breathing, Brahmari, and Omkara, etc.) for 20 minutes twice daily for a period of 12 weeks. Patients were trained to perform Omkara at high pitch (forceful) with prolonged exhalation as compared to normal Omkara. Group B was treated with meditation
for 20 minutes twice daily for a period of 12 weeks. Subjective assessment, FEV1%, and Peak Expiratory Flow Rate (PEFR) were done in each case initially and after 12 weeks. The result revealed that after 12 weeks, group A subjects had significant improvement in symptoms, FEV1, and PEFR as compared to group B subjects. Hence, breathing exercises (pranayama), mainly expiratory exercises, improved lung function subjectively and objectively and should be regular part of therapy.

**Vempati R, Bijlani RL, Deepak KK (2009)** identified the effectiveness of lifestyle modification based on yoga versus wait list among 57 asthmatics. The intervention consisted of 2 week supervised training in lifestyle modification and stress management based on yoga followed by closely monitored continuation of the practices at home for 6-weeks and the outcome measures were assessed at 1,2,4 and 8 weeks. The findings revealed significant reduction in Exercise Induced Bronchoconstriction (EIB) in the yoga group, improved lung function, exercise challenge, improved Quality of Life and improved rescue use in both the groups and no change in inflammatory markers.

**BirdeeGS, Legedza AT, Saper RB, Bertisch SM, Eisenberg DM, Philips RS (2008)** conducted a nation wise cross-sectional survey (n= 31044) to characterize yoga users, medical reasons for use, perceptions of helpfulness, and disclosure of its use to medical professionals. The result findings revealed that yoga users were predominately Caucasian (85 %) and female (76 %) with a mean age of 39.5 years. The yoga users were patients with musculoskeletal conditions (OR 1.561, CI 1.42-1.83), mental health conditions ( OR 1.43, CI 1.22-1.67), and asthma ( OR 1.27, CI 1.05-1.54) was independently associated with higher yoga
use. A majority of yoga users (61 %) felt yoga was important in maintaining health, though only 25 % disclosed yoga practice to their medical professional.

**TuberkToraks, Tokem Y (2006)** identified the Complementary and alternative medicine (CAM) therapies such as herbal therapy, acupuncture, yoga, chiropractic, relaxation techniques, nutrition and dietary supplements, continue to gain popularity as modalities for treatment of asthma. A number of study in this area has shown frequently used CAM therapies by patients with asthma. It has found that parents who had children with asthma preferred common CAM therapies such as massage, relaxation techniques, diet and vitamin and that adult patients with asthma used commonly nutrition and diet supplements, herbal therapies and homeopathy and yoga. Furthermore; it is suggested that health professionals should have much knowledge about CAM therapies in asthma they have an active role in the development guidelines related to CAM interventions.

**Sabina et al (2005)** found that pranayama reduces stress, a common asthma trigger. Breathing techniques and improved control of breathing by yoga in 62 patients of asthma may contribute to the control of asthma symptoms. Breathing exercises emphasized in yoga have the potential to improve lung function and quality of life in asthmatics.

**Oguzturk (2005)** examined the psychological status and quality of life in 70 elderly patients with asthma aged > or = 60 years and 40 age-matched comparison was done. The result revealed that patients with long standing asthma (> or = 8 years) had lower quality – of- life scores than those with recent onset asthma. The worse quality of life is predicted by anxiety, depression and asthma
severity scores among elderly patients may be partly related to psychological status indicators.

Cooper S, Oborne J, Newton S, Harrison V, Thompson Coon J, Lewis S, Tattersfield A (2003) determined the effects of the Buteyko breathing technique, a device which mimics pranayama (a yoga breathing technique), and a dummy pranayama device on bronchial responsiveness and symptoms were compared over 6 months in a parallel group study among 90 patients taking an inhaled corticosteroid were randomised after a 2 week run in period to Eucapnic Buteyko breathing, use of a Pink City Lung Exerciser (PCLE) to mimic pranayama, or a PCLE placebo device. Subjects practised the techniques at home twice daily for 6 months followed by an optional steroid reduction phase. Bronchodilator use was reduced in the Buteyko group by two puffs/day at 6 months; there was no change in the other two groups (p=0.005). No difference was seen between the groups in FEV1, exacerbations, or ability to reduce inhaled corticosteroids.

Miller AL (2001) explained that asthma is a multifactorial disease process with genetic, allergic, environmental, infectious, emotional, and nutritional components. The underlying pathophysiology of asthma is airway inflammation. The underlying process driving and maintaining the asthmatic inflammatory process appeared to be an abnormal or inadequately regulated CD4+ T-cell immune response. The T-helper 2 (Th2) subset produced cytokines including interleukin-4 (IL-4), IL-5, IL-6, IL-9, IL-10, and IL-13, which stimulate the growth, differentiation, and recruitment of mast cells, basophils, eosinophils, and B-cells, all of which are involved in humoral immunity, inflammation, and the
allergic response. In asthma, this arm of the immune response is overactive, while Th1 activity, generally corresponding more to cell-mediated immunity, is dampened. It is not yet known why asthmatics have this out-of-balance immune activity, but genetics, viruses, fungi, heavy metals, nutrition, and pollution all can be contributors.

2.1.6 Research related to effects of yoga on pulmonary functional measures

Karmur et al (2015) conducted the prospective study to find effects of 10 weeks yoga practice on pulmonary function tests among 40 subjects aged between 20 to 65 years. The result revealed that respiratory rate to be decreased, while breath holding time and maximum ventilator volume to be increased in the subjects. The study concluded that yoga practice could be advocated to improve respiratory efficiency for healthy individuals as well as an alternative therapy or as adjunct to conventional therapy in respiratory diseases.

Biju, Geetha, Sodhakumari (2012) investigated the physiological parameters and pulmonary functions and severity among 70 asthma patients who were on beta 2 agonist inhalers and yoga therapy for three months. The findings revealed that yogic practices resulted in significant improvement in pulmonary functions; decrease in respiratory rate; decrease in pulse rate and body weight which was not statistically significant; decrease in frequency of asthma attacks and decrease in frequency of use of inhalers. All the pulmonary functions were improved in the yoga group, except for FEV$_1$ all the parameters showed statistically significant difference between the case and control group at the onset of study. PEFR showed significant difference between the two groups.
Singh et al (2012) conducted a randomized controlled study of 60 patients that revealed that the lung function improved significantly in the patients of the yoga group after two months of yoga practice from the baseline. Hence the study concluded that pranayama and yoga breathing could be used to increase respiratory stamina, relax the chest muscles, expand the lungs, raise energy levels, and calm the body.

Sodhi C, Singh S, Dandona PK (2009) studied the effect of yoga training on pulmonary functions in patients with bronchial asthma. One hundred twenty patients of asthma were randomized into two groups i.e Group A (yoga training group) and Group B (control group). Each group included sixty patients. Pulmonary function tests were performed on all the patients at baseline, after 4 weeks and then after 8 weeks. Majority of the subjects in the two groups had mild disease (34 patients in Group A and 32 in Group B). Group A subjects showed a statistically significant increasing trend (P < 0.01) in % predicting peak expiratory flow rate (PEFR), forced expiratory volume in the first second (FEV1), forced vital capacity (FVC), forced mid expiratory flow in 0.25-0.75 seconds (FEF25-75) and FEV1/FVC% ratio at 4 weeks and 8 weeks as compared to Group B. Thus, yoga breathing exercises used adjunctively with standard pharmacological treatment significantly improved pulmonary functions in patients with bronchial asthma.
2.2 CONCEPTUAL FRAMEWORK

INTRODUCTION

Conceptual framework presents logically constructed concepts to provide general explanation of the relationship among the concepts of the research study. The conceptual framework identified for this study is the modified Health Promotion Model (HPM) by Nola J. Pender (1996), to assess the effectiveness of integrated approach of educational tools and yoga in the overall outcome among patients with bronchial asthma attending outpatient services at a tertiary care hospital.

ABOUT THE THEORIST

The health promotion model (HPM) proposed by Nola J. Pender, PhD, RN, FAAN - former professor of nursing at the University of Michigan 1982; revised in 1996 was designed to be a “complementary counterpart to models of health protection”.

It defines health as "a positive dynamic state not merely the absence of disease". Health promotion is directed at increasing a client’s level of well-being, describes the Multi-dimensional nature of persons as they interact within their environment to pursue health.

The concepts of this model were modified and utilized for the current study. The underlying assumptions of this study were integrated into the application of this model. It is conceptualized that implementation of proactive integrated approach improves individual’s knowledge, attitude and self-efficacy, controls asthma symptoms, improves pulmonary functional measures and quality
of life and adherence to the health promoting behaviours among the patients with bronchial asthma at Sri Ramachandra Hospital. The components of the model in this present study are discussed below:

ASSUMPTIONS OF THE STUDY

- The health promotion model notes that each person has unique personal characteristics and experiences that affect subsequent actions.
- The set of variables for behavioral specific knowledge and affect have important motivational significance.
- These variables can be modified through nursing actions.
- Health promoting behavior is the desired behavioral outcome and is the end point in the HPM.
- Health promoting behaviors should result in improved health, enhanced functional ability and better quality of life at all stages of development.
- The final behavioral demand is also influenced by the immediate competing demand and preferences, which can derail an intended health promoting action.

MAJOR CONCEPTS AND DEFINITIONS

- Individual Characteristics and Experience
- Prior related behaviour
- Frequency of the similar behaviour in the past. Direct and indirect effects on the likelihood of engaging in health promoting behaviors.
APPLICATION OF THE CONCEPTS IN THIS STUDY

a. INDIVIDUAL CHARACTERISTICS AND EXPERIENCE

Individual characteristics and experiences include personal, biological, psychological and socio-cultural factors which help to shape the target behavior being considered.

The personal factors of the study participants include the background variables that comprises of demographic, clinical and pulmonary variables.

The demographic variables are age, sex, education, occupation, income, religion, residence, type of family and family history of asthma. The clinical variables are duration of illness, triggers, current medications. The outcome variables are knowledge, attitude and self-efficacy, asthma control, pulmonary functional measures and quality of life.

b. BEHAVIOUR SPECIFIC CONDITIONS AND AFFECT

According to this model, the individual characteristics and experiences coexist with cognitive-perceptual mechanisms that influence health promotion behavior. The cognitive perceptual factors (Primary motivational mechanisms) are

(i) PERCEIVED BENEFITS OF ACTION

Anticipated positive outcomes that will occur from health behavior. In this study the awareness of disease process, life style modification factors and yoga technique practices are believed to influence the need to undertake a health behavior.
(ii) PERCEIVED BARRIERS TO ACTION

Anticipated, imagined or real blocks and personal costs of understanding a given behavior. In this study, the barriers are fear, anxiety, activity limitation and quality of life. The other barriers include lack of time, lack of motivation, energy, social support, inadequate knowledge on the disease process and triggers and poor confidence in carrying out the integrated approach.

(iii) PERCEIVED SELF EFFICACY

Judgment of personal capability to organize and execute a health-promoting behaviour. Perceived self-efficacy influences perceived barriers to action; so higher the efficacy lower the perception of barriers to the performance of the behavior. In this study, the individual’s perceived self-capabilities to implement the integrated approach that include knowledge on disease process and practice of yoga technique are included. The motivational factors in performing the health behavior include the vulnerability and outcome expectation.

(iv) ACTIVITY RELATED AFFECT

Subjective positive or negative feeling that occur before, during and following behavior based on the stimulus are properties of the behaviour itself. Activity-related affect influences perceived self-efficacy, which means the more positive the subjective feeling, the greater the feeling of efficacy. In turn, increased feelings of efficacy can generate further positive affect. In this study, the factors that could influence the behavior of the study participants are the integrated approach that include the following:
A group teaching for the study subjects on integrated approach (knowledge on disease process, triggers, management) and yoga technique practices for 15 minutes using booklet on wheezer’s anonymous and demonstration of yoga techniques for 30 minutes on first visit and day 3 and return demonstration on the follow up visits. Review of daily log followed by the reinforcement on the follow up visits on avoidance of triggers and yoga technique practices.

(v) INTERPERSONAL INFLUENCES

Cognition concerning behaviours, beliefs, or attitudes of the others. Interpersonal influences include: norms (expectations of significant others), social support (instrumental and emotional encouragement) and modelling (vicarious learning through observing others engaged in a particular behaviour). Primary sources of interpersonal influences are families, peers, and healthcare providers. In this study, the interpersonal factors that influence are teaching cum demonstration on disease process and yoga techniques between the investigator and the study participants, clarification of the doubts and reinforcements by the researcher are considered.

(vi) SITUATIONAL INFLUENCES

Personal perceptions and cognitions of any given situation or context that can facilitate or impede behaviour. Situational influences may have direct or indirect influences on health behaviour. In this study, active participation in the study, issuing of booklet and reinforcements, daily log, self-motivation, intention, social expectation are thought to be influences in the patient’s behavior.
(c.) BEHAVIOURAL OUTCOME

(i) COMMITMENT TO PLAN OF ACTION

The concept of intention and identification of a planned strategy leads to implementation of health behaviour. In this study, this refers to the study participants level of adherence to proactive integrated approach and also the reinforcements in person by the investigator can serve as an motivation to carry out the health behavior. The other factors are other modes of source of information such as newspaper, mass media, peer influences and from the health personnel.

(ii) IMMEDIATE COMPETING DEMANDS AND PREFERENCES

Competing demands are those alternative behavior over which individuals have low control because there are environmental contingencies such as work or family care responsibilities. In this study it includes inadequate adherence to proactive integrated approach. The reasons are negative reaction towards yoga practices and time constraints.

Competing preferences are alternative behaviour over which individuals exert relatively high control, such as choice of ice cream or apple for a snack. In this study, it refers to daily log, practice schedule, self -motivation and adherence to integrated approach. The telephonic reinforcement by the researcher is also an influencing factor to keep the study group on track to adhere to the intervention.
(iii) HEALTH PROMOTING BEHAVIOUR

Endpoint or action outcome directed toward attaining positive health outcome such as optimal well-being, personal fulfillment and productive living. In this study, it refers to the improvement or no change in knowledge, attitude and self-efficacy, asthma control, quality of life and pulmonary functional measures and a decrease or no change in the outcome variables.
Figure 3. Modified Health Promotion Model (Nola J. Pender, 1996)