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Review Article

Loneliness and its Relationship with Respiratory Diseases

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Abstract: Loneliness has profound harmful effects on health. This includes the respiratory system. Several studies have documented its deleterious effects on COPD, asthma, lung cancer, respiratory infections, and even interstitial lung diseases. Further, these patients are often burdened with several chronic co-morbidities, which often further worsen respiratory ailments. Lonely individuals also are noncompliant with several lifestyles which may negatively affect the respiratory system. And finally, lonely people tend to delay health evaluation and are often noncompliant with health recommendations. All these factors make lonely individuals at greater risk, increased severity, and poorer prognosis of respiratory disorders. Further, chronic respiratory diseases can also induce or worsen preexisting loneliness. This narrative manuscript narratively reviews the harmful effects of loneliness on the commonly seen respiratory disorders.

Keywords: Loneliness, COPD, asthma, lung cancer, respiratory infections, OSA, interstitial lung disease.

INTRODUCTION

Human beings are social animals [1]. A lack of a desired social companionship (emotional loneliness) or a robust social network (social loneliness) is associated with an increase in ill-health [2]. These two conditions, although somewhat different in etiology, are often inter-related [3]. However, their impact on health is essentially the same [4]. This manuscript uses the term 'loneliness' interchangeably and represents both emotional and social loneliness.

Loneliness is pervasive all over the world – be it high-income countries, middle-income countries, or low-income countries [5-10]. Loneliness is common in European countries [5]. Its incidence is common in Eastern European countries such as Ukraine (34.0%), Russia (24.4%), Hungary (21.1%), and Poland (20.1%) [6]. Nicolaisen and Thorsen found that it is also common in the Scandinavian population. In their study of Norwegian adults (n = 14,743) the rate of loneliness was - 30.2% in those over the age of 65 years [7]. In the United States of America (USA), it is estimated that 25–29% of individuals aged 70+ years old suffer from loneliness [8]. In China, loneliness has been reported in 28% of older Chinese adults [9]. Its prevalence has been seen in 25.3% to 32.4% of individuals in Latin America and 18.3% in India [10]. It is also prevalent in Africa [11, 12]. Data indicates that its worldwide incidence is on the increase [13, 14].

Loneliness affects all age groups [15] and appears to increase with increasing age [16]. Chronic diseases, disability, widowhood, and a decrease in personal and friendship networks are common as a person gets older, and these enhance loneliness in this population [17, 18]. Other factors increasing the risk of loneliness include the female gender [19], low education [20], and poverty [21].

Loneliness is simple to diagnose [22-26]. The de Jong Gierveld Loneliness Scale (originally an 11-item self-administered questionnaire) has been adapted to a six-item version to evaluate emotional loneliness and social loneliness and is quite commonly used [22]. Another scale, adapted from an original 20 item scale, is the UCLA 3-item questionnaire, and this is fast becoming the international standard [23]. The questions used are, "How often do you feel that you lack companionship?", "How often do you feel left out?" and "How often do you feel isolated from others?". Each question is graded on a 3-point scale (1 = hardly ever; 2 = some of the time; 3 = often). Higher total scores indicate higher loneliness levels. Some researchers have used a single question, such as 'Do you feel lonely?' [24]. 'Do you suffer from loneliness?' [25] or 'Are you ever bothered by feelings of loneliness?' [26]. This single question-based diagnosis is also extremely reliable [27].

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DISCUSSION

Loneliness is not a benign condition [28-42]. It aggravates several serious conditions like CVDs – one meta-analysis found risks of coronary heart disease and stroke to be increased by nearly one-third in these individuals [28]. In patients with heart failure, higher perceived loneliness is associated with more frequent ambulatory and emergency room visits and hospital admissions [29]. It also deleteriously affects obesity [30], diabetes mellitus [31], several cancers [32], arthritis [33], sleep disorders [34], and dementia [35]. Lonely individuals are also more susceptible to infections [36]. Loneliness is also associated with a host of psychiatric disorders including depression [37], personality disorders [38], anxiety [39], alcoholism [40], suicidal ideation [41], and self-harm [42]. The COVID-19 pandemic-related concerns and restrictions has further increased psychological distress [43]. Lonely individuals report poor self-rated health [44] and a poor quality of life [45]. Their overall mortality is increased [46]. It has been estimated that in the US the hazard ratios (HRs) for chronic diseases are increased from 1.17 [47] to 1.45 [48]. According to Vivek Murthy, the US Surgeon General, the reduction in life span associated with loneliness is like that caused by smoking 15 cigarettes a day and is greater than that attributed to obesity [49]. Lonely individuals also feel that they have a higher (than actual) disease burden, further impacting their quality of life [50]. They incur higher health care costs [51]. On the other hand, poor health can also contribute to social isolation and loneliness [52-55]. Loneliness also harms the respiratory system, and this is seen with the commonly encountered respiratory ailments [56, 57].

COPD

Chronic obstructive pulmonary disease (COPD) is a common chronic respiratory condition [58]. Smokers, men, and individuals that are older than 40 years have a higher incidence [58]. It is the fourth most common cause of death in the USA [59]. Loneliness is more common in COPD patients when compared to individuals without COPD [60-62]. Loneliness also affects their spouses, at the same [61] or even a higher level [63]. In a study by Keele-Card *et al*., moderate to high levels of loneliness were present in sixty-three percent of those with COPD while this number was 67% in their spouses [60]. COPD patients decrease the time spent outside the home due to breathlessness and this worsens the loneliness [63]. COPD is characterized by frequent exacerbations, which require frequent emergency department visits or hospitalization [63, 64]. A study by Geller *et al*., showed that the emergency room visits are increased by 60% in this population [65]. Increasing breathlessness decreases their quality of life and increases disability – and this further increases loneliness [61]. There is significant stigmatization as the disease is considered self-inflicting by many family and friends, leading to further social isolation [66]. These patients also experience high levels of comorbidity [67]. This further increases the disease burden and increases the isolation [68]. Loneliness also increases their mortality [69].

Asthma

Severe asthma is a heterogeneous airway disease [70]. It is often a difficult disease to control, and asthmatic patients experience frequent life-threatening acute attacks [71]. These individuals require a high level of therapeutic care and report a poor health-related quality of life [72]. They frequently have co-morbidities such as anxiety and depression [73] which negatively influence their HRQoL [74]. Children (10-14 years old) and the elderly (75-79 years old) with asthma often experience frequent disability and may die prematurely, Overall, asthmatic patients are responsible for a significant healthcare burden on society [76].

Loneliness is associated with an increased incidence of asthma [77]. Christiansen *et al*., used logistic regression analysis on self-reported data from the 2017 Danish Health and Morbidity Survey (n = 19,890) and found that asthma is increased in emotionally lonely individuals [78]. Further, asthma patients tend to avoid sports teams and are attracted to sedentary occupations –limiting their activity and social participation [79]. They also face significant societal stigma [80]. These factors result in social isolation and increase their loneliness [81].

Lung Cancer

Lung cancer, a highly invasive, rapidly metastasizing, and prevalent cancer, is the top killer cancer in both men and women in the United States of America (USA) [82]. It causes more deaths per year than the next four leading causes of cancer (Colon/rectal, breast, pancreas, and prostate) deaths combined in the USA [82]. It is also a leading cause of death in the world [83]. Most lung cancers are non-small cell (85%) and these are mainly adenocarcinoma and squamous cell carcinoma. The remaining 15% are small cell carcinomas [83]. Prognosis is poor as most patients (approximately 75%) are only diagnosed when the malignancy is in an advanced stage (stage III or IV) - leading to poor survival [84]. Data from the United Kingdom shows that stage IV lung cancer patients show a 1-year survival rate of only 15–19% - while those with stage I show a 1-year survival rate of 81–85% [85]. An early diagnosis is therefore critical, but several factors, including loneliness, thwart this diagnostic urgency.

Loneliness is common in lung cancer patients [86]. Loneliness exerts a multitude of negative effects on cancer, including increasing its risk [87], magnifying the symptoms [88], accelerating the disease progression [89], worsening the health-related quality of life [90], and decreasing survival [91]. Cancer by itself may initiate loneliness [92]. These patients also feel greater guilt [93] and experience greater stigma, especially if

they were smokers [94], leading to further isolation [95]. The perceived stigma may delay medical help-seeking behavior, leading to a delay in diagnosis and poor prognosis [96-98]. Cancer and its treatment-related side effects further aggravate social isolation99. Further, these patients often have co-morbidities [100] and poor health lifestyles [101] which are further conducive to loneliness. Fear of premature death is another major factor, and is partly responsible for the associated depression, further distancing these individuals from friends and relatives [102]. Informal caregivers of advanced cancer patients, often suffer from significant psychological problems, and this negatively influences their social life, heralding loneliness in this group also [103, 104].

Viral Infections of the Respiratory Tract

Loneliness decreases immunity [105, 106]. In a study done by Cohen et al, individuals given nasal drops containing rhinoviruses were less susceptible to common colds, if they had more social ties [107]. They also had a better ciliary clearance of their nasal passages and shed fewer viruses. Burns *et al*., noted that in undergraduate students, poor social ties led to a poor antibody response after meningitis C conjugate vaccination [108]. In a more recent study involving healthy university freshmen, Pressman et al found that students with high levels of loneliness and a small social network had the lowest antibody response to influenza vaccination [109]. Loneliness results in chronic stress [110]. Chronic stress results in the production of more proinflammatory cytokines [111], leading to a dysregulation of the immune system [112] and an increase in susceptibility to infections.

On the flip side, infections may increase loneliness and social isolation [113, 114], especially in people who were already at a higher risk of being lonely - people with low household income and adults living alone [115]. This has been well illustrated by the recent COVID-19 pandemic [116].

Loneliness and Pregnancy-related respiratory problems in the offspring

Maternal loneliness predicts a higher burden of respiratory tract infections in the offspring [117]. Lonely pregnant mothers often have poor lifestyles and maintain an unhealthy nutritional status [118]. Many of these behaviors are bi-directionally related to loneliness and its associated stress and depression [119, 120].

Loneliness and Lifestyle Factors

Lonely individuals also lead poor lifestyles, which increases the risk of respiratory system diseases (all below). Not only do they smoke more, but they also have a harder time giving up the nicotine addiction [121]. Almost 20% of smokers develop COPD [122], and they have a 20-fold higher risk of developing lung cancer [123]. Lonely people are also more likely to drink [124]. Alcohol intake has been deleteriously linked with COPD [125], lung cancer [126], lung trauma [127], and respiratory infections [128]. Lonely individuals are more prone to develop obesity [129]. This may increase the risk of asthma [130]. Lonely people exhibit more sedentary behavior and are less likely to partake in regular physical exercise [131]. This is unfortunate as most studies have found that physical activity has beneficial effects on asthma [132], COPD [133], lung cancer [134], and interstitial lung disease [135]. Lonely individuals also eat poorly [136]. Several studies have associated a prudent diet with better results in patients with asthma [137], COPD138, OSA139, and lung cancer [140, 141]. Lonely individuals also have a less healthcare-seeking behavior [142, 143] and are less compliant with medicines and other therapeutic recommendations [144] – with a deleterious effect on respiratory diseases.

Biological Mechanisms

Biological mechanisms behind the harm inflicted by loneliness on lung diseases are many and include a dysregulated hypothalamic-pituitary-adrenal axis function [145] and increased inflammation [146]. Chronically elevated inflammation negatively affects the immune system [147].

Respiratory diseases causing loneliness

Chronic health conditions, including those affecting the respiratory system, often increase an individual's social isolation and/or loneliness [129].

CONCLUSION

The experience of feeling lonely or being isolated from other members of an individual's community has serious health consequences. Robust social health is an important part of well-being. However, people all over the world are lonelier today. This is despite the world becoming smaller and more digitally connected. Other factors enhancing this isolation include the trend toward late marriages and an increase in two-income and single-family households. The recent COVID-19 pandemic restrictions have further increased the feelings of loneliness and social isolation. Most of the common respiratory ailments, such as asthma, COPD, OSA, lung cancer, respiratory infections, and interstitial lung disease are significantly impacted by loneliness/social isolation. Loneliness during pregnancy also worsens the respiratory health of the offspring. Lonely individuals tend to lead poor lifestyles, and this further promotes respiratory illnesses. Several interventions have been developed to reduce loneliness and social isolation and these should help decrease this harmful association.

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