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# Adolescent Obesity and Mental Health Status in Asian Countries: A Systematic Review

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#### Abstract

Adolescence is a critical period for developing weight related problems and also related to depression. According to National Mental Health Survey (NMHS) 2015-16, it has been declared that there is no health without mental health. This study is an attempt to do the systematic review of literature on adolescent obesity related to mental health status in the Asian countries. Studies were identified from the electronic databases like Pubmed, Science Direct, Psych INFO, Google Scholar etc. A total of 252 articles, 160 articles were extracted out of which only 11 articles fulfill the eligibility criteria. Age group varies from 10 to 19 years. For physical health status, Body Mass Index (BMI) is the primary indicator. Result shows that a significant positive relationship has been found between BMI and body shape measure. Studies also suggest that the common mental health problems among the obese adolescents are anxiety disorders, depressive disorders and behavioural disorders. The key factors are responsible for these are age, sex, parent's

education, parent's occupation, family income, academic stress, body shape dissatisfaction, body image perception and self esteem.

Keywords: Obesity, Mental Health status, Adolescents, Asia

AMS Classification: 97M70.

#### 1. Introduction

Adolescence (10-19 years) is a transitional period between being a child and becoming an adult. It is also a time to develop knowledge and skills, learn to manage emotions and relationships, and acquire attributes and abilities that will be important for enjoying the adolescent years and assuming adult roles (Fares et al., 2006; The State of the World's Children, 2011). Adolescence is a period of life with specific health and developmental needs and rights (Lloyd, 2005). It is a critical period for developing weight problems and also related to depression. Numerous covariates of the association between variation of weight and depression have been described, especially in adolescence, such as age, gender, socio-economic status of the parents, family structure, level of education, race/ ethnicity, body image (Goodman et al., 2003; Sjoeberg et al., 2005; de Wit et al., 2010; Blum et al., 2000; Belue et al., 2009; Revah-Levy et al., 2011).

Adolescents comprise more than a fifth percent of India's population, an estimated 230 million people (Pillai et al., 2008). According to Census report 2011, today every fifth person in India is an adolescent. India's total population is approximately 1205.6 million. India has the largest population of adolescents in the world being home to 236.5 million (19.6%) individuals aged 10-19 years. In this, 111.9 million is female adolescent and of them 28.5% reside in urban areas (72 million) in India. (Census, 2011)

Health is crucial for growth, development and productivity of a society and also important for a happy and healthy life anywhere in the world. The World Health Organisation define health is "a state of complete physical, mental and social well being and not merely the absence of any disease or infirmity" (WHO, 2003). Overweight or obesity is an important public health concern worldwide (Ogden et al., 2002). Research on community based and populations has found that overweight or obesity in children and adolescents report a decrease in health

related quality of life such as in physical, emotional, social and school functioning when compared to average weight children and adolescents (Taveras et al., 2011).

Overweight or obesity in childhood can persist into adulthood and further compromise physical and mental health (Power et al., 1997). Besides physical health status the relationship between body weight and mental health in children and adolescents is an important issue. A positive association has been found between depression and obesity that is more severe depression is associated with greater obesity (Becker et al., 2001; Baumeister et al., 2007; Cortese et al., 2009; Richardson et al., 2006; Revah-Levy et al., 2011).

According to the Indian National Mental Health Survey 2015-16, it has been declared that there is no health without mental health and these underlines the fact that mental health is an integral and essential component of health (NMHS, 2016). Mental health is a positive concept related to the individual's social, emotional and psychological well being. It is a psychological state of a man who is functioning at a satisfactory level of passionate and behavioural adjustment. The concept of mental health include subjective well being, perceived self efficacy, autonomy, competence, intergenerational dependence and recognition of the ability to realize one's intellectual and emotional potential (WHO, 2003).

Mental health is defined as a state of well being in which people realizes their own potentialities can cope with the every day's normal stresses and work productively as well as fruitfully and are able to make contribution to his or her community. The concept is culturally defined, but generally relates to the enjoyment of life, ability to cope with daily stresses, sorrows and sadness, the fulfilment of goal and potential and a sense of connection to others. Therefore, mental health is an important aspect in individual's well being and health in general (Sankar et al, 2017).

Mental health is more than the mere lack of mental disorders (WHO, 2003). Mental disorders contribute to a significant load of morbidity and disability, even though few conditions account for an increasing mortality. Mental disorders are known to be caused by a complex interaction of biological, social, environmental, cultural and economic factors (WHO, 2001; NMHS, 2016). Mental health should be a concern for all of us, rather than only for those who suffer from a mental disorder. No group is immune to mental disorders, but the risk is higher among the poor, homeless, the unemployed, persons with low education, victims of violence,

migrants and refuges, indigenous populations, children and adolescents, abused women and the neglected elderly (WHO, 2003).

Mental disorders affect everyone, irrespective of age, gender, residence and living standards. Persons with mental disorders are also known to be associated with a wide range of social and societal problems if their illness is unrecognised or inappropriately managed. From a cultural perspective, mental disorders are associated with a considerable amount of stigma in Indian society, leading to neglect and marginalisation (NMHS, India, 2016).

Unfortunately, in most parts of the world, mental health and mental disorders are not accorded anywhere the same importance as physical health. Rather they have been largely ignored or neglected (WHO, 2003). Depression is a mental disorder that presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self worth, disturbed sleep or appetite, low energy and poor concentration (Chauhan et al., 2014). Peterson et al. (1993) defined adolescent depression at three levels as depressed mood – is sadness at various times in response to an unhappy situation, depressive syndrome – is experiencing anxiety with other symptoms such as feeling sad, lonely, unloved and worthless and clinical depression – is manifestation of five or more depressive symptoms lasting continuously for two weeks and impairing current functioning.

Studies in high income countries have shown that psychosocial health problems during adolescence, in particular depression, anxiety and substance misuse, are relatively common (Eister and Marcell, 2003; Roberts, et al., 1998; Melzer et al., 2000; Shaffer et al., 1996; Ford, 2003; Boys et al., 2003; Pillai et al., 2008).Mental health factors contribute to the onset and maintenance of overweight and obesity in children and adolescents (Talen et al., 2009). However, the psychosocial consequences of overweight or obesity in childhood are also widespread (Reilly et al., 2003). While obesity can increase the risk of depression, depression can also predict the development of obesity (Luppino et al., 2010; Lee and Yen, 2014).

A broad array of other outcomes also have been examined in relation to adolescent obesity, among them social isolation and marginalization, relational victimization, teasing and bullying, stigma, self-esteem, weight related teasing, body- image and body dissatisfaction, school performance and social functioning (Roberts and Hao, 2013).

Though there are a very less number of works have been found related to obesity and mental health status among the adolescents in Asian countries, this study is an attempt to do the systematic review of literature found on adolescent obesity related to mental health status.

# 2. Materials and Methodology

## 2.1 Inclusion & Exclusion Criteria

The search was designed to identify studies that were based on adolescents' obesity and mental health status. This included cities, school or in a community, based on Asian countries. Some inclusion and exclusion criteria have been set up before searching for articles. A list of excluded and included studies with reason for exclusion and exclusion is given below –

The inclusion criteria are-

- 1. Primary research
- 2. Overweight or obesity related study
- 3. Targeted the adolescent population
- 4. Community based research
- 5. Including mental health measure
- 6. Included a comparison or control group
- 7. Survey area will limited to Asian countries
- 8. Targeted from 2007 to 2018
- 9. Considered only original full length articles

Exclusion criteria were -

- 1. Intervention or treatment based study
- 2. Review articles
- 3. Research area out of South Asian Countries
- 4. Targeted children or adult population
- 5. Only abstracts available study

### 2.2 Search Strategy

Electronic searches of MEDLINE through PUBMED, Science Direct, PsycINFO and Google Scholar were carried out from 2006 to 2018. For this review, literature search was carried out using random combination of the following keywords –

"overweight, obesity, mental health, depression, adolescents". Initial search was carried out in PubMED, PubMED Central, NCBI, Research Gate, Google Scholar, after that a similar search was done in other search engines. Cross reference also used to find relevant articles. For designing of the study, PRISMA Flow Diagram (Fig.1) has been considered.



Figure 1: Flow diagram of studies that were identified using the search terms and strategy, articles screened for eligibility, included/ excluded with reasons, following PRISMA guidelines

# 2.3 Data collection

Data were collected from eligible studies using data extraction form. Below are the items considered -

- Publication information- Name of the journal, year of publication, name of the author, and volume, issue and page number of the paper.
- Data- Country, year of data collection, characteristics of subjects including age range of the subjects, number of sampled subjects
- Methods- Including data type, analysis method, indicators of data, and also objectives of the study
- Results- Findings of the included studies are considered here

For comparison, prevalence rate, factors responsible, association are considered.

# 3. Results

# 3.1 Study selection and data collection

The search strategy yielded 252 articles through online databases like PubMED, PubMED Central, NCBI, NIH, Science Direct, Research Gate, and Google Scholar for possible inclusion of articles. After screening 160 full length original articles (after removing 38 duplicate articles) were examined in detail to determine eligibility. Further 149 articles were excluded at this stage (Reasons are described in Fig.1) and 11 full length original articles were selected for this review work.

# **3.2 Study Characteristics**

BMI- Body Mass Index; GHQ-General Health Questionnaire; BSQ- Body Shape Questionnaire; DAWBA- Development and Well Being Assessment; BISQ- Body Image Satisfaction Questionnaire; WC- Waist Circumference; PRIME-MD PHQ9- Depression Questionnaire; MC-CES-D=Mandarin Chinese Version of the Centre for Epidemiological Studies- Depression Scale; RSES- Rosenberg Self-Esteem Scale; BDI- Beck Depression Inventory; HT- Height; WT- Weight; BIP-Body Image Perception; ESS- Educational Stress Scale; SF36- Short Form 36 Questionnaire; SDQ- Strength and Difficulties Questionnaire.

#### **3.3** Association between adolescent obesity and mental health

110

Latha (2006) found that between age and body shape of the adolescents revealed a significant positive relationship (p<0.01). There was also a positive relationship found between Body shape questionnaire (BSQ) and BMI (p<0.01), weight and BMI (p<0.01), weight and BSQ (p<0.01). There was also positive relationship found between BSQ and GHQ (General Health Questionnaire) (p<0.01). In this study, disturbance in perception of body shape was associated with younger ages that have pointed out that body shape, body size and body weight was pronounced in early adolescence. Result also shows that female adolescents were preoccupied with their appearance, body weight and shape. Though the limitation of obese study subjects (3.2% overweight, no obese subjects have been found), this study did not find a correlation between BMI and self esteem or depression.

According to Pillai et al. (2008), after diagnosing 37 adolescents through DSM-IV questionnaire, the most common disorders of mental health problems were anxiety disorders (54.1%), depressive disorders (27%), behavioural disorders (24.3%) and attention deficit hyperactive disorder (ADHD) (10.8%) found. Shah (2012) in his study stated that Indian adolescent girl students BMI (p<0.01), resting metabolism (p<0.0001), visceral fat (p<0.0001) and metabolic age were reduced significantly. He also found that only 8% girls were overweight, while 23.4% boys were overweight for their age and height. More number of girls was able to keep their body weight within normal range than their colleague boys. Mostly girls were keeping their body weight normal from skipping their meal rather than doing exercise. Though there was no pressure to keep perfect body shape but subconsciously all this plays a role to keep perfect body image.

According to Chauhan (2014), the overall prevalence of depression among study subjects were observed to be 38%. Majority of subjects (75.7%) were having mild depression followed by moderate depression (23.5%). Approximately one third (31.7%) of study subjects having BMI normal range were found to have depression followed by 39% of study subjects who were overweight were depressed. Highest prevalence of depression was observed to be in obese, i.e. 48.7% of study subjects. In this study, it was observed that prevalence of depression was increased along with increase in BMI. A statistical significant association was found between BMI and depression ( $\chi^2 = 13.7$ ; p<0.003). Lee J.I. (2014), in his study indicated that after controlling for the effects of gender, age,

residential background and level of parental education, participants who were overweight (p=0.029) or obese (p<0.0001) had a lower level of self esteem than those of average weight.

According to Yackobovitch- Gavan et al. (2014), demonstrated that obese group characterised by a significantly higher scores on body shape discrepancy (p<0.001). Mild depression was found in obese study subjects (24.5%). Mean BDI (Beck Depression Inventory) score was higher in the obese subjects than the normal weight subjects (p= 0.038). The obese groups showed a significant correlation between BDI scores and scores on the self esteem scale (p<0.001). Linear regression analysis of variables associated of variables associated with depression revealed that BMI at or above the 95<sup>th</sup> percentile (p= 0.094) lower self esteem (p<0.001) were significantly associated with a higher depression level. Divya V. et al. (2015) suggest that adolescents with high self esteem have more positive perceptions about their body. Also suggest that self esteem is positively correlated with self assessment and overall assessment of body image perceptions. That means as body image perceptions increased self esteem also increased.

Fernendes et al. (2015) in his study found that more than a quarter of students had depressive symptoms of hopelessness and sadness (26%), missed classes or school on  $\geq 1$  day during the past month (28%) and reported that parents or guardians never/ rarely checked to see if homework was done (40%), never/rarely understood problems and worries (25%), and never/ rarely knew what students were doing with their free time (29%). Jayanthi et al. (2015) found that among the adolescents 45.7% had moderate, 25.4% had mild, 19.6% had severe, and 9.3% had minimal depression according to BDI (Beck Depression Inventory) score and these are due to academic stress. A moderate positive relationship have been found between the level of depression and the level of academic stress (p<0.001).

Sankar (2017) in his study found that male adolescents have better mental health than female adolescents. Findings also shows significant mean difference between male and female adolescents (p<0.05). findings also suggest that 13-15 years old adolescents have high level of better mental health than 16-19 years old adolescents (p<0.05). Abbasalizad (2018) suggests that hyperactivity disorders and emotional disorders were the most prevalent mental health problems among the female adolescents.

# International Journal of Statistical Sciences, Vol. 19, 2020

**Table 1:** Characteristics of included studies (in chronological order of publication)

SI No.	Year of Publication	Country	Data	Analysis	Year of Data Source	No. of Sampled	Age Range	Indicator	Objective	Findings	Reference
1	2006	India	Primary	Cross sectional	2006	138	16-21 years	BMI, GHQ, BSQ	To examine the subjective perception of body weight & body shape satisfaction predict level of self esteem and depression among the female adolescents	The perception of weight problem but not BMI contributed significantly to higher scores on General Health Questionnaire (GHQ). There was a significant positive correlation between Body Shape Questionnaire (BSQ) scores and BMI, age and weight.	32.
2	2008	India	Primary	Cross sectional	2002 - 2003	2048	12 – 16 years	DAWBA	To estimate the prevalence and correlates of mental disorders in adolescents	There was no association of gender or age with the prevalence of a mental disorder. Those living in urban areas had significantly higher prevalence of mental disorders. The final multivariate model found an independent association of mental disorders with an outgoing "non- traditional" lifestyle (frequent partying, going to the cinema, shopping for fun, and having a boy friend or girl friend).	45.
3.	2012	India	Primary	Cross sectional	2011 – 2012	96	17 - 19	BMI, BISQ	To see whether Indian adolescent girl students are more conscious about their body image than their colleague boys.	BMI (p<0.01), resting metabolism (p<0.0001) and visceral fat (p<0.0001) of Indian adolescent girls were found to be significantly lower than their colleague boys. Girls are not satisfied with their body image and Indian adolescent girls are skipping their meal rather than doing physical exercise.	54.
4	2014	India	Primary	Cross sectional	2011	360	15 - 17	BMI, WC, PRIME- MD PHQ9	To estimate the prevalence of depression among adolescents in order to find out a relationship if any with different socio-economic and demographic factors.	Male study subjects (35%) were depressed less as compared to female (41.8%) study subjects. There was no significant statistical association found between depression and several socio- demographic factors. Highest prevalence of depression was observed to be in obese that is 48.7% of study subjects. Prevalence of depression was increased along with increase in BMI. Statistical significance was found between BMI and depression ( $\chi^2$ = 13.7, p<0.003).	1 0
5.	2014	Taiwan	Primary	Cross -sectional	2009	5254	12 - 18	BMI, MC- CES-D, RSES	To examine the association between body weight and mental health indicators including depression, social phobia, insomnia & self esteem.	Overweight (p<0.05) and obese (p<0.001) adolescents had a lower level of self esteem than did those of average weight. No significant differences in depression, social phobia, or insomnia were found between those who were overweight or obese and those of average weight. Socio demographic characteristics had no moderating effect on the association between body weight and mental health indicators.	33.
6.	2014	Israel	Primary	Cross -sectional	2008	79	12 - 18	BMI, BDI, RSES	To compare levels of depression and to explore socioeconomic and psychological factors related to normal and obese adolescents	Obese adolescents had a significantly higher level of depression. Obesity, lower parental income, and lower self esteem were significantly associated with a higher depression level.	62.

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	2015	India	Primary	Cross -sectional	2015	200	18 - 20	HI, WI, WC,HC, BIP, RSES	perceptions and its correlations with self esteem among the adolescents	Self esteem is positively correlated with body image perceptions. As body image perceptions (like height, weight, complexion, skin tone, hair length, chest, waist, hip measurements) increased self esteem also increased	15.
8.	2015	India	Primary	Cross - sectional		8130	11 – 17	BMI	To explore the psychosocial correlates of childhood overweight status in India.	Evidence for high prevalence of psychosocial distress and lack of social support in Indian children who are overweight based on BMI. Had depressive symptoms with hopelessness and sadness (25%). Missed classes or school on $\geq 1$ day during the past month (28%).	21
9	2015	India	Primary	Cross -sectional	2013 - 2014	1120	15 - 18	BDI, ESS	To explore the relationship between depression and academic stress	Adolescents who had academic stress were at 2.4 times (p<0.001) higher risk of depression than adolescents without academic stress	28.
1 0	2017	India	Primary	Cross -sectional	2016	40	13 - 19	NA	To assess the level of mental health among the adolescents	13-15 year male adolescents have better mental health than 16-19 year old female adolescents. Results also show that there is significant difference between the mental health scores of boys and girls.	52.
1	2018	Iran	Primary	Cross -sectional	2015 - 2016	107	15 - 17	BMI, SF- 36, SDQ	To identify the association between mental health problems, eating behaviour patterns, nutrient intakes and health related quality of life (HRQoL) among Iranian female adolescents.	The prevalence of hyperactivity disorders among female adolescents than male adolescents in high scores of "snacking and convenience", "planning ahead" and "meal skipping" eating patterns were more likely to have indicators of emotional disorders (p<0.05).mMoreover, high scores of vitality and mental components of HRQoL were associated with reduced likelihood of emotional disorders, conduct disorders and hyperactivity disorders.	1

# 3.4 Factors responsible for adolescent obesity and mental health

Various factors are responsible for adolescent obesity and mental health like age, sex, socio-economic factors, obesity related body dissatisfaction, body image perceptions, self esteem, academic stress, eating behaviour pattern and so on.

# 3.4.1 Age

Adolescence is a critical period and has a potential role in the development and persistence of obesity. The adolescent years are characteristic of changes in body

composition, physical fitness during puberty. The growth spurt and increases in body fat occurs with puberty may predispose the adolescent to weight preoccupation; body shape dissatisfaction and harmful weight control practices. Dieting during teenage years has been associated with anxiety, depression and low self esteem, nutritional deficiencies, impaired concentration as well as inhibited grow (Latha et al., 2006).

### 3.4.2 Sex

Female adolescents are more preoccupied with physique and appearance than are those in other age groups (Bruch , 1981) and they are more likely to identify themselves as overweight than are males (Kann et al., 1998). For females as compared with males, there is a greater discrepancy between their perceived body size and their ideal body size (Gardener et al., 1999).

#### 3.4.3 Socio-economic Variables

Socio-economic variables like parent's education, parent's occupation, family income, residing area, relation with peer group, gender discrimination and parental support played major role to develop mental health problems to the adolescents. According to Yackobovitch-Gavan et al. (2014) suggest that depression scores were significantly higher in person having low family income than person with middle family income. This study also suggests that depression score were significantly higher in obese children of non-academic mothers than obese children of academic mother. According to Pillai et al. (2008) suggest that those living in urban areas had significantly higher prevalence of mental disorders. Study also suggests that those adolescents who had a small number of friend and a 'frequent' leisure score were independently associated with mental disorders. Multivariate analysis found that being able to talk easily with mother, reporting family as being the primary source of support, gender based discrimination of girls and a medium or high parental stress score compared with a low score were independently associated with mental disorder.

### 3.4.4 Obesity related body dissatisfaction

Body shape dissatisfaction is an important factor observed in adolescents. In many cases body shape dissatisfaction arises mental health problems which leading them to unnecessary fitness regime. It is also observed that adolescents, though not being overweight or obese carry pseudo-consciousness about their body shape.

## **3.4.4.1 Body image perceptions**

Body image perception is a perception of persons own body, it involves how a person sees themselves. Negative body image consists of a disoriented view of one's body shape whereby one may often feel self conscious or feel ashamed and assume others are more attractive and develop mental health problems. Adolescents are satisfied with many of the dimensions which are less observable like eye colour, neck shape, ear shape, eye size and nose shape, generally these dimensions go unnoticed by self. Though there are some aspects which leading them to falling under negative satisfaction or perception for them or for the society like weight, complexion, waist and hip circumference measurements. This might be because majority of the adolescents are emphasizing beauty as an important aspect in their life (Divya et al., 2015)

### 3.4.4.2 Self esteem

Self esteem has a major role in mental steadiness and obesity of adolescents. In many studies, it has been found that persons' having overweight or obese structure lack their self esteem which leads to major mental health problems. According to Divya et al. (2015) suggest that self esteem and body image is positively correlated. That means as body image perceptions increased, self esteem also increased. It is interesting to note that general body perception is positively correlated with individual efforts indicating that adolescents who gave importance to beauty, spent more money to look beautiful. The same can be seen in terms of individual efforts which are positively correlated with general perceptions and regrets about body indicating that adolescents who have concerns and ideas about their body dimensions also have regrets regarding body about weight, height and complexion.

### 3.4.4.3 Academic stress-

Academic matters are the most important sources of stress for young people and have significant associations with mental health problems, such as depression, anxiety and suicidal ideation (Anderman, 2002; Ang et al., 2006). According to Jayanthi et al. (2015), a moderate positive relationship have been found between the level of depression and the level of academic stress (p<0.001). Adolescents with academic stress were found to have 2.4 times (p<0.001) more risk of having depression than the adolescents without academic stress.

#### 3.4.4.4 Eating behaviour pattern

Adequate nutrition and healthy food choices are known to be an important factor in the development of brain and prevention of cognitive disorders; unhealthy eating behaviours are important determinants of mental health problems in adolescents (Weng et al., 2012; Lien et al., 2006). Abbasalizad et al. (2018) found a significant relationship between behavioural eating patterns and mental health problems in female adolescents independent of age and BMI. Adolescents with higher adherence to "snacking and convenience", "planning ahead" and "meal skipping" eating patterns were more likely to have indicators of emotional disorders. Additionally adolescents in high scores of "low fat" eating pattern were less likely to have hyperactivity disorder.

#### 4. Discussion

World Health Organisation (2001) reported that, mental health problems among children and adolescents increased in recent years and were predicted to increase upto 50% by the year 2020 (Sankar et al., 2017).

Ranasinghe and Ramesh, in their study reported that 25.5% students had symptoms of depression, 8.6% reported loneliness, while 7.8% reported anxiety related insomnia (Ranasinghe and Ramesh, 2016). Wani et al., found that girls have higher level of stress anxiety and depression than boys (Wani et al., 2016). Surapuramath reported that boys have better mental health than girls (Surapuramath, 2016). Hinshaw under covered the fact that friends and family members plays vital role in maintaining and stability mental health (Hinshaw, 2005). Sughayr and Ferwana highlighted that girls are more stressed than boys. Findings also show that 13-15 years old adolescents have high level of mental health than 16-19 years old adolescents (Sankar et al., 2017).

Obesity and depressive disorders are central public health issues and the relationship between depression and weight remains unclear (Faith et al., 2002; McElroy et al., 2004). The prevalence of depression in this study present on the basis of the ADRS measure specific to adolescents was 4.5% among boys and 10.4% among girls. Many epidemiological studies have shown that girls have typically been found that to display higher levels of depressive symptoms than boys (Compas et al., 1997; Essau et al., 2010). This has been attributed to genetics, increased prevalence of anxiety disorders in females, biological changes

associated with puberty, cognitive predisposition and socio-cultural factors (Breslau et al., 1998).

Mood depression disorder (MDD) occurring by early adolescence predicted the development of obesity in late adolescence among females. Conversely, obesity with an onset during late adolescence predicted the onset of MDD in early adulthood among females. Conversely, obesity with an onset during late adolescence predicted the onset of MDD in early adulthood among females. Obesity may be a more stigmatized condition among females (Falkner et al, 2014; Tiggemann et al, 1988) and /or women may be more likely to eat to cope with negative feelings than men (Ingledew et al., 1996; Marmorstein et al., 2014).

Over consciousness among girls make them victim of eating disorder and body image dissatisfaction is very common among girls (Rierdan et al, 1987; Rierdan et al., 1988). Being obese was associated with a significantly increased poor perceived mental health and any mood disorder. For girls, there was an association between being obese and worse perceived mental health and any mood disorder. The obese were at greater risk of lower life satisfaction and worse perceived mental health (Roberts and Hao, 2013).

Prevalence of mental disorders was nearly twice (13.5%) as much in urban metros as compared to rural (6.9%) areas. The prevalence of high suicidal risk was more among females and in those residing in urban metros (1.71%). Prevalence of mental disorders in age group 13-17 years was 7.3%, nearly 9.8 million of young Indian's aged between this age are in need of active interventions. A recent study among 15-24 years in the state of Himachal Pradesh revealed that adolescents suffered from a wide range of mental health conditions like depression (6.9%), anxiety (15.5%), suicidal ideation (5.5%) requiring urgent interventions (Gururaj et al., 2014). While the overall current prevalence estimate was 10.6% in the total surveyed population, significant variation in overall morbidity are seen across the different surveyed states in India, ranging from 5.8% in Assam to 14.1% in Manipur. Among all these West Bengal is in fourth position, the prevalence is 13% followed by Punjab (13.4%), Madhya Pradesh (13.9%) and Manipur (14.1%). (NMHSI, 2016).

Published studies from India similarly show a wide range of prevalence of psychiatric morbidity in adolescents ranging from 2.6% to 35.6%. Another study from South India (Nair et al., 2004) reported that 3% prevalence of depression

among school attending adolescents (13-19 years). Higher rates are generally reported in older adolescents (>16 years) who are experiencing a more rapid transition to adulthood (Pillai et al., 2008).

Study found that both overweight and obese adolescents aged 10-13 years also found that overweight or obese adolescents had significant lower self esteem on all self esteem related items on the self perception profile for children than did children of average weight; disturbed eating and the experience of being bullied were also significantly related to low self esteem in the overweight/obese group (Danielsen et al., 2012; Lee and Yen, 2014).

In the present study, the prevalence of depression was found to be 38%. Most of the study subjects (75.7%) were found to be suffering from mild depression, whereas, 23.5% subjects were moderately depressed. Depression among the females was more (41.8%) as compared to that among males (35%). However, there was no statistical association between gender and depression. In a study by Maharaj and Subbaiah (2010), stated that females had higher prevalence (62%) than the males (40.5%).

Sjoberg et al. (2005) had also reported similar findings in their study group of aged adolescents between 15 and 17 years. Obesity seems to play an important role in depression as in the present study, it was observed to be significantly associated with depression and with increase in the BMI. The prevalence of depression was also observed to be increased (Chauhan et al., 2014).

# **5.** Conclusion

Therefore it may be concluded that deliver good quality mental health care, several activities and programme components should work effectively and efficiently together, and this is referred to as the system approach.

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