

Review Article on Anorexia Nervosa

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Abstract— Background: Anorexia nervosa is a highly distinctive serious mental disorder. It can affect individuals of all ages, sexes, sexual orientations, races, and ethnic origins; however, adolescent girls and young adult women are particularly at risk. There is no single cause for anorexia, may be caused by a combination of psychological, sociocultural and biological factors.

Objectives: the aim of this review article is to provide an overview on the epidemiology of anorexia nervosa as one of the common eating disorders, to illustrate the gender difference of anorexia nervosa and to identify some of the causes and risk factors associated with this issue.

Literature of review: The prevalence of anorexia nervosa among women is 0.5–1.0% around the world. Previous studies suggested that anorexia nervosa is the disease of western countries and it is only affect females; however, many studies revealed now that it is more common to appear in males than previously thought. Cultural difference explained higher rate of anorexia nervosa in western countries compared to non-western, as western culture greatly value the thinnest in young women. In contrast being thin is something that is socially undesirable in most non-western culture.

Conclusions: Although, anorexia nervosa is the issue of Western-countries; however recent evidence suggests its spread in both genders among non-Western countries. Many factors explained this phenomenon, of which Western media exposure, peer and family pressure, genetic and molecular factors and other psychological factors as sexual abuse and low self-esteem.

Index Terms— anorexia nervosa; eating disorders; epidemiology; prevalence, incidence; risk; cause; gender.

1 INTRODUCTION

Anorexia nervosa (AN) is a highly distinctive serious mental disorder. It has an impact on individual of all ages, sexes, races and ethnic origins. Uniquely, it has a particular risk at adolescent girls and young adult women [1].

People who are affected by this disorder characterized by disruption in both cognitive and emotional functions. Together with strong fear of weight gain and a disturbed body image, which induce intense dietary restriction or other weight loss behaviors, like purging or intense exercise and any physical activity [1],[2].

Anorexia nervosa is multifactorial illness, in other word this condition is caused by combination of biological, sociocultural and psychological factors. In addition, the exposure to the western ideal body through media and magazines has prominent role in body dissatisfaction and can change ideal body image via internalizing specific body types in both genders [3].

In the past decades the general incidence of anorexia nervosa remained unchanged; on the other hand some studies reveal that in past two to three decades there is growing in the incidence of anorexia nervosa. Anorexia nervosa can emerge at any age, but typically it begins in early or mid-adolescence [4].

Females with age group of 15-19 years old are at the higher risk for this illness. However, it is not clear if this age group determines an earlier detection or earlier age at onset of ano-

rexia nervosa cases [5].

Male to female ratio in many studies is 1:8 respectively. In children, the sex distribution is less skewed. In high-income countries, in the general population the lifetime prevalence of anorexia nervosa is reported to be around 1% in women and less than 0.5% in men [6].

Anorexia nervosa in adults and older adolescents is generally has a deteriorating or extended course and levels of infirmity and mortality which are elevated, specifically without treatment [2],[6].

Adolescents, who are suffering from anorexia nervosa, have higher rate of full recovery in comparison with adult, with mean mortality 2% versus 5% in adults [2].

2 RATIONALE/ JUSTIFICATION OF THE REVIEW

1- Anorexia nervosa has the highest rate of mortality among all mental disorders [7], so it is critical condition that's need further researches to address it.

2- There are serious limitations in the available epidemiological data, primarily differences in the conditions included among eating disorders and the lack of acceptable epidemiological studies from low- and middle-income countries, especially in non-western countries [8].

3 OBJECTIVES

Therefore, the purpose of this literature review is:

- To highlight and provide an overview on the epidemiology of anorexia nervosa as one of the common eating disorders,
- To illustrate the gender difference of anorexia nervosa, and
- To identify some of the contributing and risk factors associated with this new matter for increasing awareness toward this problem.

4 REVIEW OF LITRUTER

4.1 Concept of eating disorders and anorexia nervosa:

4.1a Eating disorders:

"Eating disorders are complex psychiatric syndromes in which cognitive distortions related to food and body weight and disturbed eating patterns can lead to significant and potentially life threatening medical and nutrition complication" [9]. There is three type of eating disorder; anorexia nervosa (AN), bulimia nervosa (BN) and eating disorder not otherwise specified (EDNOS) [10].

Eating disorders most often appear between the ages of 12 and 19; however, it can also present later in life. Almost 90% of individual affected by eating disorder are women, but the disease can develop in men as well. Eating disorder present in all kind of environment but is possibly over-represented in the world fashion, esthetics, ballet and weight dependent sports [11].

4.1b Anorexia nervosa:

Anorexia nervosa is a serious and possibly mortal illness, its etiology is still unknown [12]. A lot of neurobiological studies believed that anorexia nervosa resulting from defect in the neuronal processes of appetite and emotionality. People who have this illness experience extreme body dissatisfaction, a fancy of being fat, an extreme desire to lose weight and to become thinner, refuse to maintain a healthy body weight due to an excessive fear of gaining weight [13].

Eating disorder as anorexia nervosa and bulimia nervosa develop as a result of unhealthy weight control behavior such as fasting, use of laxative, taking diet pills and vomiting on purpose after eating [14].

False perception on the body image is the core feature of anorexia nervosa, and this distortion of body shape is indeed as a diagnostic criterion for the disorder [15].

Table 1: Diagnostic criteria for anorexia nervosa [15].

TABLE 1 Diagnostic Criteria for Anorexia Nervosa
Refusal to maintain body weight at or above a minimally normal weight for age and height (e.g., weight loss leading to maintenance of body weight less than 85% of that expected; or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected).
Intense fear of gaining weight or becoming fat, even though underweight.
Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight.
In postmenarcheal females, amenorrhea, i.e., the absence of at least three consecutive menstrual cycles. (A woman is considered to have amenorrhea if her periods occur only following hormone, e.g., estrogen, administration.)
<i>Specify type:</i>
Restricting Type: During the current episode of anorexia nervosa, the person has not regularly engaged in binge-eating or purging behavior (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas).
Binge-Eating/Purging Type: During the current episode of anorexia nervosa, the person has regularly engaged in binge-eating or purging behaviors (i.e., self-induced vomiting or the misuse of laxatives, diuretics, or enemas).
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4.2 Epidemiology of anorexia nervosa

4.2a Prevalence of Anorexia nervosa

The prevalence of AN among women is 0.5–1.0% around the world [16]. In the past, transcultural studies conducted in (1970-1980) revealed that anorexia nervosa was infrequent in non-Western countries [17]; however, recent studies conducted later prove that anorexia nervosa occurs in non-Western countries, which may be due to influence of Western media as movies, TV shows, and magazines [16].

Negative eating behaviors occur considerably in western and non-western countries and among Whites as well as among Asians and Blacks [18].

1-Western countries:

Western culture greatly values the thinnest in young women, so the prevalence of anorexia nervosa is higher than in non-western and Middle East countries [16]. In a previous study conducted by Rathner & Tury et al, presented that in Western countries the prevalence rates for anorexia nervosa ranged from 0.1% to 5.7% in female subjects [19].

1. a Prevalence of anorexia nervosa before 2005:

A conservative study conducted in North America by Lucas and Beard et al. 1991 determined that among females with ages between 15 and 19 the prevalence of anorexia nervosa was 0.48%. Also, stated that AN outstand the third most common chronic illness after obesity in this age group (10-25%) [20].

Another, two studies by Rathner and Messner, 1993; Gotestam and Eriksen et al, 1995 that were performed on girl students to establish the occurrence of anorexia nervosa suggest that the prevalence is higher in Norway (2.6%) than in Italy (1.3%) [21],[22].

In contrast, a population-based study regarding anorexia nervosa was done in United Kingdom revealed 0.1% prevalence of AN among female students between 15 to 19 years old which

was lower in the general population than among students [23]. Furthermore, in Norway another study was done for psychiatric female revealed a prevalence of anorexia nervosa of 5.7% [21].

1. b Prevalence of anorexia nervosa after 2005 :

In a previous study that was done by Hoek HW, 2006 in United states to estimate the recent literature on the incidence and prevalence of anorexia nervosa. Among young females the prevalence rate for anorexia nervosa was 0.3 % [7].

On the other hand, the lifetime occurrence of AN has been measured in three large cohort studies of twins. In Sweden, it was 1.2 % (AN) in the largest twin study of women from the 1935–1958 birth cohorts. In the Australian study the lifetime prevalence of female twins aged 28–39 years was 1.9 % with an additional 2.4% for partial anorexia nervosa (absence of amenorrhea) . In a large sample of 1975–1979 birth females from cohort study of Finnish twins, the lifetime prevalence of AN was 2.2 % [16].

A research study achieved by Stice et al, 2009 which was taken a minute sample of 496 adolescent girls over an 8-year period from early adolescence into early adulthood, they found 0.6 % a lifetime prevalence for AN by age 20 years [24].

In Portugal, the occurrence of AN among young females was 0.39 %. In an Australian population-based sample of 1,597 14-year old boys and girls, only one case of AN was identified by means of a self-report eating disorder screening questionnaire; four other subjects met partial criteria for AN [25].

Moreover, the prevalence of anorexia nervosa is 0.5% in the Hungarian sample and 0.2% in the Romanian sample of young women. For subclinical symptoms of AN, the rate in the Hungarian female sample was 1.1 %, and in the Romanian female sample 3.0% [26].

2- Non-Western countries:

2. a Prevalence of anorexia nervosa before 2005:

In non-Western countries the prevalence of anorexia nervosa in population-based and patient-based study was ranged from 0.002% to 0.9% [16].

In another survey study conducted in Japan, revealed that the female patient population suffer from AN about 1.5 times more than the general population, however, the prevalence rate was still only 0.0063% [27].

In Hong Kong, Lee announced in his study that In comparison with Western countries the sufferers of anorexia nervosa were very few [16]. Nakamura's survey in 2000 proposed that the prevalence of anorexia nervosa was 0.0048% among 1326 clinics and 130 hospitals in Japan [27].

2.c Prevalence of anorexia nervosa after 2005:

In a recent study used questionnaire-based survey in Iran, illustrated that the prevalence of anorexia nervosa among school girls is 0.9%. In addition, another study reported 6.3% eating

disorder prevalence among Iranian high school girls with symptoms including 1.7% anorexia nervosa, 1.7% bulimia nervosa and 2.9% kinds of not otherwise specified (NOS)] [28].

Several epidemiological studies and clinical reports in Japan showed AN prevalence from 0.025% to 0.2%. On the other hand, they concluded that the prevalence in Japan remains lower compared to that in Western countries [16].

In very recent systematic review and meta-analysis study done in 2016 to evaluate the epidemiology of anorexia nervosa, bulimia nervosa, and binge-eating disorder (BED) in Latin America. Of 1583 records screened, 17 studies from Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela were included in the analysis. These studies established an average point-prevalence rate of 0.1% for anorexia nervosa 1.16% for bulimia nervosa, and 3.53% for (BED) in the general population [29].

In addition, the study that was done in Western Europe and North America found that point-prevalence for anorexia nervosa ranges from 0 to 0.9% with a mean estimate of 0.29% in the high-risk population of young females. The findings of this study explained that the prevalence rates for anorexia nervosa are comparable among the different countries in Latin America, and significantly lower compared to European or North American samples [30].

Similar prevalence rates were found in Hispanic immigrants in the United States .This might be due to the different body ideal of Latinas and Latinos compared to other ethnicities, which idealizes a 'curvier' shape and higher weight of the body than in Western countries [31].

Many research indicates that it is rare to find anorexia nervosa among females in Arab culture . Being thin is something that is socially undesirable in Arab culture, because of traditional values which appreciate and consider plumpness as a sign of wellbeing in both genders; also it is seen as a symbol of womanhood and fertility in females. There is a positive correlation between increased body weight and higher social class has been observed in the Arab culture [32].

4.2b Incidence of Anorexia nervosa:

The community based studies estimating the incidence of anorexia nervosa are scarce. Previous study by Currin et al, which sought for the Database of AN of the General Practice Research in the UK , between 1994 and 2000 in comparison to their findings data in another study for 1988–1993, indicated that the extent rate of AN was steady in the both study periods, depending upon the age-adjusted and sex-adjusted : "In 2000 it was 4.7 per 100 000 person-years, compared with 4.2 per 100 000 person-years in 1993"[33].

Also, the overall incidence of anorexia nervosa was 1.82 per 100 000 persons per year in a study performed by Hoek, van Harten et al.2005 [34].

In addition, a large community study carried out by Rahkonen et al, 2007 to calculate the rate of AN showed an incidence rate of 270 per 100 000 person-years in 15–19 year old Finnish female twins during 1990–1998 [35].

Many studies in north Europe were combined in a meta-

analysis to conduct the incidence of AN in mental health care (figure 1). The registered incidence of AN in Europe has been in increase until the 1970s. Since 1970, the occurrence of AN in Europe seems to have been moderately stable [7].

Figure 1 Registered yearly incidence of anorexia nervosa in mental healthcare in northern Europe in the 20th century

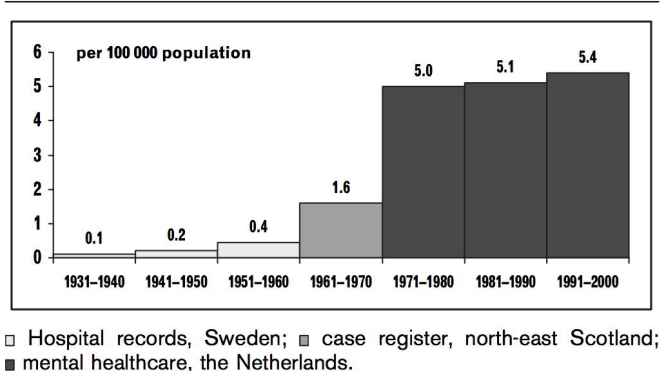


Fig. 1: Registered Yearly Incidence of Anorexia Nervosa [7].

Another population cohort study of young women was done in United State. The incidence of DSM-IV anorexia nervosa for ages 15–19 years was 270 per 100,000 person-years [35].

4.3 Gender difference of anorexia nervosa

American Psychiatric Association, 2000 documented that the sex ratio of anorexia nervosa was approximately 9:1 [15]. In reality only few studies reported incidence rate of AN for males. The conclusion of these studies was that the occurrence of anorexia nervosa among males is less than 1.0 per 100000 persons per year [33]. Currin et al, 2005 concluded that anorexia nervosa occurs in males as well as in females. The mean prevalence of AN in adults (ages 18 and older) living in the United States is 0.9% among women and 0.3% among men this data are from the National Comorbidity Study-Replication [33].

Based on data from other studies, the clinical presentation of anorexia nervosa is rare. The psychopathology and clinical presentation of anorexia nervosa except amenorrhea appear to be similar in males and females. As a matter of fact males show psychiatric comorbidity, have sexual concerns and inclined towards hard exercise more frequently than females [36].

The age of onset of anorexia nervosa in males vary. However, it is believed that because of the later onset of puberty in males, the onset of anorexia nervosa is tend to present at a later age than females [36].

A past study conducted in United States on a large representative sample of adolescents, reported lower female-to-male ratio (10:1) than the ratio found in the Finnish twin study and other previous review [35].

Many studies revealed that anorexia nervosa now is more common to appear in males than previously thought. Also, anorexia nervosa is commonly under detected in males than in females [35].

4.4 Causes and risk factors of anorexia nervosa

4.4a Risk factors for AN:

Information about risk factors is critical for understanding the etiology and development of the disease, and for the classification and design of effective treatments. Kraemer et al, 1996 defined a risk factor as “a characteristic, event, or experience that predates a given disorder and is associated with an increased probability of that disorder compared with the general population” [37].

Risk factors that have most potency for the development of anorexia nervosa are weight concerns and dieting. On other hand, there are factors with medium potency such as sexual abuse and physical neglect. The following risk factors are confirmed in more than one study, but their potency could not be evaluated [38].

- Female gender
- Ethnicity –compared with Caucasians, Hispanics display equal rates, native Americans higher rates, and Blacks and Asians lower rates;
- Low self-esteem, i.e., negative self-concept or ineffectiveness;
- Change in and level of psychiatric morbidity as well as negative affectivity; and
- Low interceptive awareness, i.e., interpretation of emotional and gastrointestinal stimuli;
- High use of escape–avoidance coping and low perceived social support is prospective risk factor.
- Eating and digestive problems in childhood (e.g., picky eating) predicted AN and BN diagnosis;

Age is a stable, but non-specific, risk factor for all EDs, as their onset peaks in adolescence. In twin studies that conducted to assess the genetic contribution in the development of anorexia nervosa the result was 48-76%. In addition, the heritability studies have found an increased rate of EDs among relatives with AN or BN [39].

4.4b Causes of AN:

Currently, anorexia nervosa considered to be complex disorder with multifactorial etiology, involving biological, sociocultural factors, and psychological like most other psychiatric syndromes [40].

BIOLOGICAL FACTORS:

1-Genetic:

It has been demonstrated that anorexia nervosa has biological predisposition and hereditary components which has a role in the expansion of abnormal eating behaviors, markedly, first-degree female relative and first-degree indistinguishable twin of individuals with BED, AN or BN boast highest average of

dietary disorder diagnoses than the general population [39], [41].

Hereditary slant and sociocultural impact are affirmed to be cooperating to fill in as a stimulant for the advancement of dietary issue. For example, a young lady with a family history of dietary issue may search for appearance-related feedback and/or captivate in activities focused on appearances (e.g., reading weight-loss magazines, swimming and cheerleading) therefore, interaction in society where the appearance is the matter and counted as her strength. In like manner, inspired by the ideal body figure through media may provide extra factor that contribute to increase shape and weight worries [41].

Studies have been done in which polymorphisms were found to occur in 43 different genes, the latter being related to motivation, reward mechanisms, personality traits and emotions. Moreover, consistent associations have been found for polymorphisms of genes [42].

2-Hormonal factors:

During starvations there are chemicals released by the brain, many studies reported that subjects suffering from AN are addicted to these chemicals. In the same fashion another study performed on a case of anorexia nervosa. The individual who suffer from AN reported feeling happy and satisfied about herself when undergoing starvation [43].

Ghrelin (orexigenic hormone) is a hormone produced in the gut. It is often termed the hunger hormone, and sometimes called lenomorelin may play a role. A study was done in 2013 offered that anorexic subjects may have lower ghrelin bio-activity due to an alteration in carrier-antibody affinity, thus causing a decline in efficiency in its transportation to the brain and therefore cut down hunger sensation [44].

3-Serotonin dysregulation:

Several lines of evidence propose that disturbances of serotonin (5-HT) pathways have a role in development of Anorexia nervosa. A British-based study found that individuals with AN have alterations in serotonin receptors, which consecutively impact appetite [45].

Similarly, another Brain imaging studies, using 5-HT specific ligands, show that "disruption of 5-HT function arise when people are ill, and remain after recovery from bulimia nervosa and anorexia nervosa. It is presumed that a trait-related disturbance of 5-HT neuronal modulation precedes the onset of anorexia nervosa and contributes to premorbid symptoms of anxiety, obsession, and inhibition" [45].

SOCIOCULTURAL FACTORS:

The variations in the results from different countries are due to several reasons [16]. In industrialized and Western cultures the impact of culture on the development of AN has been considered, also it is accepted that this cultural impact is more familiar among young women than men, also, it is demonstrate the importance of thinness for ladies in different cultures [16].

Striegel-Moore et al ,2007 claims that exposure to the western approach of the ideal body figure, often via magazines, TV, and

the Internet, boost internalization of the thin ideal have a role in anorexia nervosa [39].

Also, many sociocultural studies explained that culture maybe a cause, trigger or simply a kind of marker which determines in which sector of society or cultures AN is more likely to develop. The supposition of this network is that culture acts as a cause by providing a blueprint for AN to develop. Thus, this connection offers that culture may trigger the illness which in turn is determined by multiple factors such as; individual psychology, family interactions or biological predisposition [43].

There are many triggers related to the expansion of anorexia nervosa, social pressure considered as the main trigger that contribute in the etiology of anorexia nervosa, which emerge from the woman prettiness standards of the western culture or the modern industrial society [43].

1-Environmental effect:

Environmental factors that contribute in the anorexia nervosa pathogenesis are registration to ballet schools, teasing by family and friends, and comments and advices from authority figures (doctors, nurses, teachers, trainers) about need to change weight [46].

Also, a previous study reported that degree of urbanization constitutes potential environmental triggers of dietary problem [41].

2-Family and Peer pressure:

Peer pressure was confirmed to be a significant contributor to body image dissatisfactions in various studies; Also, its leads to development of negative eating behaviors among subjects in their teens and early twenties [42].

The study in Iran shown that an Shown that individual who perceived pressure from family and peers at high risk for anorexia nervosa [28].

According to many studies, mothers have greater effects on body dissatisfaction and eating disorders in their daughters [44].

3-Media:

Numerous studies revealed that throughout the 70s ,80s and beyond there is a shift in the media imagery used in films, magazines and television from the idealization of a voluptuous female figure in the 1960s to a progressively thinner ideal .The effect of media results in an unhealthy preoccupation with body size is by promoting an unrealistic aesthetic ideal of the young female body [47].

Individuals with a larger body size according to modern Western society they are seen as unattractive and sexually unappealing. Also, if someone look fat or he/she is not committed to his/her ideal body weight, so this is reflected to lack of self-control and laziness. A positive association has been established between media exposure and body dissatisfaction [48].

Experimental studies also showed that female students reported significant increases in body dissatisfaction when they were exposed to peer modeling of thin-ideal internalization or social pressure about being thin [11].

The media's portrayal of thinness as a standard of female at-

tractiveness is thought to play a determining role in women's contentious relationship with their bodies by pressuring them to lose weight and be thin. Indeed, a meta-analysis of 47 experimental studies has shown that body dissatisfaction has been reported among women and teenagers after acute exposure to media image of thin women compared to that of usual sized women [49].

PSYCHOLOGICAL FACTORS:

Psychological factors like low self-esteem, negative affect and massive dissatisfaction with appearance may have a role. Also, there is another factor contributes to development of anorexia nervosa which is broken relationships such as over-protective parenting, conflicts and significant parental enhancement [50]. History of abuse or trauma appears to be more familiar in individuals diagnosed with dietary issue than the general population. In one study of eating disorder identified that sexual abuse is highly represented in individuals with AN and BN approximately by 20 to 50 percent [46].

5 LIMITATION OF THE REVIEW

Although the research has reached its aim, there were some unavoidable limitations. First, the review article includes mostly Foreign countries rather than Arabic countries especially Saudi Arabia that because lack of research about anorexia nervosa in Arab societies despite the presence of this phenomenon in recent decades. Second, it includes the old studies, more than new studies, also because of insufficient recent data.

6 CONCLUSIONS

In conclusion, anorexia nervosa is a type of eating disorders which is showing increasing importance recently and affecting annually many young individuals of both gender around the world. However, women are perceived as being more vulnerable. Although, anorexia nervosa often asserted as Western culture-bound phenomenon, but recent evidence suggests that this issue has spread among non-Western countries this is because of influences of foreign cultures through media.

Anorexia nervosa has no specific cause, it is multifactorial with combination of biological, sociocultural and psychological factors. The effect of media is identified as being responsible for the emerge of symptoms resort to negative eating behaviors. Also, peer and family pressures is considered in several articles as a risk factor linked to engage in negative eating behaviors. Self-esteem is another factor that has a crucial bearing on the personal perception of the body image and satisfaction with this image and can be affected by advertising. Future research should be conducted in Arabic countries. Also, more studies are needed to update the prevalence and incidence of AN worldwide.

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8 REFERENCES

- [1] American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-5. Washington, DC: American Psychiatric Association; 2013. □
- [2] Arcelus J, Mitchell AJ, Wales J, Nielsen S. Mortality rates in patients' □with anorexia nervosa and other eating disorders. A meta-analysis of 36 studies. *Arch Gen Psychiatry* 2011; 68: 724-31. □
- [3] Smith H, Pharm B, Pharms MR . Anorexia nervosa and eating disorders. *S Afr Pharm J* 2012;79(6):34-36.
- [4] Attia E. Anorexia nervosa: current status and future directions. *Annual Review of Medicine* 2010; 61: 425-35.
- [5] Smink FR, van Hoeken D, Hoek HW. Epidemiology of eating disorders: incidence, prevalence and mortality rates. *Curr Psychiatry Rep* 2012 ;14:406-41 .
- [6] Zipfel S, Giel EK , Bulik CM, Hay PH, Schmidt U. Anorexia nervosa: aetiology, assessment, and treatment . *Lancet Psychiatry* 2015; 2(12):1099-111
- [7] Hoek HW. Incidence, prevalence and mortality of anorexia nervosa and other eating disorders . *Current Opinion in Psychiatry* 2006; 19:389-394.
- [8] QIAN J, HU Q, WAN Y, LI T, WU M, REN Z, YU D. Prevalence of eating disorders in the general population: a systematic review. *Shanghai Archives of Psychiatry* 2013 ;25(4):212-223.
- [9] American Dietetic Association. Position of the American Dietetic Association: nutrition intervention in the treatment of anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified (ED-NOS). *J Am Diet Assoc* 2001;101(7):810-819.
- [10] American Psychiatric Association. Diagnostic and statistical manual of mental disorders. Fourth edition text revision. Washington, DC American Psychiatric Association; 2004 .
- [11] Want SC. Meta-analytic moderators of experimental exposure to media portrayals of women on female appearance satisfaction: Social comparisons as automatic processes. *Body Image* 2009;6: 257-269.
- [12] Mustelin L, Sileh Y, Raevuori A , Hoek HW, Kaprio J, Keski-Rahkonen A. The DSM-5 diagnostic criteria for anorexia nervosa may change its population prevalence and prognostic value. *J Psychiatry Res* 2016; 77:85-91.
- [13] Kaye WH, Wierenga CE, Bailer UF, Simmons AN, Bischoff-Grethe A. Nothing tastes as good as skinny feels: the neurobiology of anorexia nervosa. *Trends Neurosci* 2013; 36:110-120.
- [14] Gonsalves D, Hawk H, Goodenow C. Unhealthy Weight Control Behaviors and Related Risk Factors in Massachusetts Middle and High School Students. *Maternal and Child Health Journal* 2013;18 (8):1803-1813.
- [15] American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Text revision. 4th ed. Washington, DC: American Psychiatric Association; 2000 .
- [16] Makino M, Tsuboi K, Dennerstein L. Prevalence of Eating Disorders: A Comparison of Western and Non Western Countries. *Med Gen Med* 2004; 6(3):49. □

- [17] King MB, Bhugra D. Eating disorders: lessons from a cross-cultural study. *Psychol Med* 1989; 19:955-958.
- [18] Striegel-Moore RH, Fairburn CG, Wilfley DE, et al. Toward an understanding of risk factors for binge-eating disorder in black and white women: a community-based case-control study. *Psychol Med* 2005; 35:907-917. □
- [19] Rathner G, Tury F, Szabo P. Eating disorders after the political changes in the formerly communist Eastern-European countries. *Orv Hetil* 2001; 142:1331-1333.
- [20] Lucas AR, Beard CM, O'Fallon WM et al. A 50-year trend in the incidence of anorexia nervosa in Rochester, Minn.: A population-based study. *Am J Psychiatry* 1991; 148: 917-22.
- [21] Rathner G, Messner K. Detection of eating disorders in a small rural town: an epidemiological study. *Psychol Med.* 1993 ;23:175-184.
- [22] Gotestam KG, Eriksen L, Hagen H. An epidemiological study of eating disorders in Norwegian psychiatric institutions. *Int J Eat Disord.* 1995;18:263-268.
- [23] Rooney B, McLelland L, Crisp AH, Sedgwick PM. The incidence and prevalence of anorexia nervosa in three suburban health districts in south west London, U.K. *Int J Eat Disord.* 1995;18:299-307.
- [24] Stice E, Marti CN, Shaw H, Jaconis M. An 8-year longitudinal study of the natural history of threshold, subthreshold, and partial eating disorders from a community sample of adolescents. *J Abnorm Psychol.* 2009;118(3):587-97.
- [25] Allen KL, et al. Risk factors for full-and partial-syndrome early adolescent eating disorders: a population-based pregnancy cohort study. *J Am Acad Child Adolesc Psychiatry.* 2009;48(8):800-9.
- [26] Kovács-Krizbai T, Szabó P. Prevalence of eating disorders in Romanian, Hungarian and Saxon secondary school students in Transylvania. *Psychiatr Hung* 2009; 24(2): 124–32.
- [27] Nakamura K, Yamamoto M, Yamazaki O, et al. Prevalence of anorexia nervosa and bulimia nervosa in a geographically defined area in Japan. *Int J Eat Disord.* 2000 ;28: 173-180
- [28] Garrusi B, Baneshi MR. Eating Disorders and Their Associated Risk Factors among Iranian Population – A Community Based Study. *Global Journal of Health Science.* 2013;5(1):193-202.
- [29] Kolar DR, Rodriguez DL, Chams MM, Hoek HW. Epidemiology of eating disorders in Latin America: a systematic review and meta-analysis. *Curr Opin Psychiatry* 2016;29: 363-371 .
- [30] Smink FR, van Hoeken D, Donker GA, et al. Three decades of eating disorders in Dutch primary care: decreasing incidence of bulimia nervosa but not of anorexia nervosa. *Psychol Med* 2016; 46:1189 -1196.
- [31] Schooler D, Daniels EA. I am not a skinny toothpick and proud of it': Latina && adolescents' ethnic identity and responses to mainstream media images. *Body Image* 2014; 11:11-18.
- [32] Hamid AR .Anorexia Nervosa in Arab Culture: A Case Study. *Journal of Law and Psychology* 2010;2078-1083
- [33] Currin L, Schmidt U, Treasure J, Jick H. Time trends in eating disorder incidence. *Br J Psychiatry* 2005; 186:132-135. □
- [34] Hoek HW, van Harten PN, Hermans KME, et al. The incidence of anorexia nervosa on Curaçao. *Am J Psychiatry* 2005; 162: 748-752 .
- [35] Keski-Rahkonen A, et al. Epidemiology and course of anorexia nervosa in the community. *Am J Psychiatr.* 2007;164(8):1259-65. □
- [36] Crisp A .Collaborators: Anorexia Nervosa in Males: Similarities and Differences to Anorexia Nervosa in Females. *Eur Eat Disorders Rev* 2006;14: 163-167.
- [37] Kraemer HC, Kazdin AE, Offord DR, Kessler RC, Jensen PS, Kupfer DJ. Coming to terms with the terms of risk. *Archives of General Psychiatry* 1996; 54:337-343.
- [38] Jacobi C, Hayward C, de-Zwaan M, Kraemer HC, Agras WS. Coming to terms with risk factors for eating disorders: application of risk terminology and suggestions for a general taxonomy. *Psychological Bulletin* 2004;130: 19-65.
- [39] Striegel-Moore R, Bulik C. Risk factors for eating disorders. *American Psychologist* 2007;62 (3): 181-198.
- [40] Pike KM, Hilbert A, Wilfley DE, et al. Toward an understanding of risk factors for anorexia nervosa: a case-control study. *Psychological medicine.* 2008;38(10):1443-1453.
- [41] Mazzeo S, Bulik C. Environmental and genetic risk factors for eating disorders: what the clinician needs to know. *Child and Adolescent Psychiatric Clinics of North America* 2008; 18: 67-82.
- [42] Rask-Andersen M, Olszewski PK, Levine AS, Schiath HB. Molecular mechanisms underlying anorexia nervosa: Focus on human gene association studies and systems controlling food intake. *Brain Res Rev* 2009; 62:147-64.
- [43] Aquilina FF, Agius M, Sharma K. The multifactorial etiology of eating disorders outlined in a case of anorexia nervosa and complication by psychiatric co-morbidities. *Psychiatria Danubina* 2014;26(1):250-255.
- [44] Takagi K, Legrand R, Asakawa A, Amitani H, Franaois M, Tennoune N, Coaffier M, Claeysens S, do Rego JC, Dachelotte P, Inui A, Fetissoff SO. Anti-ghrelin immuno- globulins modulate ghrelin stability and its orexigenic effect in obese mice and humans. *Nature Commun-* 2013; 4.
- [45] Kaye WH, Bailer UF, Frank GK, Wagner A, Henry SE. Brain imaging of serotonin after recovery from anorexia and bulimia nervosa. *Physiology & Behavior* 2005; 86:15-7.
- [46] McKnight. "Risk factors for the onset of eating disorders in adolescent girls: results of the □McKnight longitudinal risk factor study". *The American Journal of Psychiatry.* 2003; 160 (2): 248-54. □
- [47] Kluck AS. Family influence on disordered eating: The role of body image dissatisfaction. *Body Image* 2010;7: 8-14.
- [48] Derenne JL, Beresin EV. Body image, media, and eating disorders. *Academic Psychiatry* 2006;30: 257-261.
- [49] Grabe S, Ward LM, ve Hyde JS. The role of the media in body image concerns among women: A meta-analysis of experimental and correlational studies. *Psychological Bulletin* 2008;134(3): 460. □
- [50] Gonzalez A, Kohn M, Clarke S. Eating disorders in adolescents. *Australian Family Physician* 2007; 36 (8): 614-619.