Disordered Eating Attitude and Associated Factors among University Students in Ulaanbaatar, Mongolia

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Abstract
Background: There have been no studies on the prevalence of disordered eating attitudes (DEAs) in Mongolia. This study aims to determine the prevalence of DEAs and the associated risk factors among university students in Ulaanbaatar, Mongolia.

Methods: In 2016, a cross-sectional survey was conducted among 483 female students studying at School of Nursing, Mongolian National University of Medical Sciences in Ulaanbaatar. The Eating Attitudes Test (EAT-26) was used to determine the prevalence of DEAs among the students. Body height and weight measurements were collected by team members after obtaining participants’ consent. SPSS version 25 was used for statistical analyses. Chi-square, Fisher’s exact, and Mann-Whitney U tests were used to analyze ordinal and numeric values.

Results: In this study 5.4% of the participants presented high score on EAT-26. Through multivariate logistic regression analysis, the number of breakfasts per week, perception of healthy meals, and previous and present dieting were found to be associated with a high score on the EAT-26.

Conclusions: The prevalence of DEA is relatively low among Mongolian female students. The number of breakfasts per week, past and current experience of dieting, and perception of healthy meals were influential factors in the development of DEAs.

1. Introduction

Disordered eating attitude (DEA) covers a variety of eating related problems such as meal skipping, frequent dieting, fluctuations in body weight, feelings of guilt and shame associated with eating, preoccupation with food, body dissatisfaction, low self-esteem, and depression. Furthermore, some studies have revealed that DEA may be a risk factor for celiac disease, gastrointestinal disorders, and may be harmful to the psychological well-being of young people. DEA is also one of the risk factors that contributes to the development of eating disorders (EDs). Both anorexia nervosa and bulimia nervosa are classified as EDs.

EDs are found in individuals worldwide and it is noteworthy that EDs are on the rise in Asia due to the influences of Western culture. It is crucial to improve our understanding of the diversity and distinctiveness of EDs in individual countries and how these are related to industrialization and urbanization. According to Japanese national surveys, EDs have increased rapidly from a prevalence rate of 1.18% to 12.74% over the 20-year period from 1982 to 2002 among female university students, as well as the general population. This prevalence rate is getting closer to those of Western countries due to Western cultural influences on Japanese society that
emphasize dieting to achieve a thin body. Some studies have shown that the dissimilarity between sociocultural alteration and beliefs in different countries can influence eating problems. Research on eating disorders has largely focused on adolescents, as adolescence is an intense anabolic period when requirements for all nutrients increases and EDs may impact on growth. In addition, studies have shown that age can influence the development of DEAs and lead to EDs, especially in females aged 20 to 30 years who tend to become underweight. EDs are the most common psychiatric problem affecting young women. Recent studies among university students suggest that both DEAs and EDs are more common among female than male students. A study showed that there is a high prevalence of EDs among medical students in Ipoh, Malaysia: 119 (42.7%) of the 279 participants were positive for EDs. Consistent with previous research, more female students (3.2%) displayed at-risk eating attitudes than male students (1.2%), as observed by a study conducted on medical students in China

In the report of the National Survey of Nutrition Status of the Population of Mongolia, the prevalence of obesity has increased considerably in the population from 15–49 years and stands at 48.8% for males and 46.2% for females. Obesity has become a major public health problem as well as a risk factor for many non-communicable diseases such as diabetes and stroke. However, there have been no Mongolian studies conducted among the population to reveal the influencing factors such as DEA or their prevalence. We therefore identified a need to study the risk factors for DEAs among female university students in Ulaanbaatar, Mongolia.

2. Methods

2.1 Study design

This study was a cross-sectional survey conducted in 2016 at the School of Nursing, Mongolian National University of Medical Sciences, Ulaanbaatar, Mongolia. Ulaanbaatar is the capital of Mongolia with an area of 4700 square km and a total population of 1.2 million; Ulaanbaatar city administration is divided into nine administrative districts.

2.2 Participants

The study participants were female university students. In total 590 students were invited to the study and 524 were participated. Completed data from 483 university students were used for analysis.

2.3 Ethics

This study was conducted with permission from the Bio-medical Research Ethics Committee of the Mongolian University of Medical Sciences (Approval number 8/3/2016–08). Before data collection, informed consent was obtained from students willing to participate in the study after they were informed about its purpose and procedures. Prior to data collection, all participants gave consent, affirming their rights to privacy and confidentiality. All procedures performed in the study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards for human participants.

2.4 Questionnaire

This study was cross-sectional study used a self-administered questionnaire and the questionnaire items are shown in Tables 1. The questionnaire elicited information regarding characteristics such as participants’ age, major field of study, university year, number of breakfasts eaten in a week over the previous month, number of meals per day over the previous month, their perceptions of healthy meals, experience of dieting, and current dieting. DEAs were determined by using the Eating Attitude Test-26 (EAT-26) developed by Garner, Olmstead and Garfinkel (1982), in which 26 questions are grouped into three subscales: dieting (13), bulimia and food preoccupation (6), and oral control (7). Twenty-five of the questions have six possible responses with different point values: “always” (3), “usually” (2), “often” (1), “sometimes” (0), “rarely” (0), and “never” (0). The 26th question has a different points value: “always” (0), “usually” (0), “often” (0), “sometimes” (1), “rarely” (2), and “never” (3) A score less than 20 points indicates a good eating attitude.

2.5 Body Mass Index (BMI)

Each participant was measured in meters (m) and their weight in kilograms (kg) using the Japanese Omron Karada Scan HBF-701 (certified by the Mongolian Agency of Standardization and Metrology) by the members of the research team. BMI was calculated as weight (kg)/height square (m²). BMI classifications were underweight (BMI: under 18.5), normal (BMI: 18.5–24.9), and obese (BMI: 25 and more).

2.6 Statistical analysis and independent variables

All statistical analyses were performed using the IBM SPSS version 25.0, and the significance level was set at p<0.05. Descriptive statistics were used to analyze the frequencies and percentage, median and inter-quartile range of continuous variables. Chi-square and Fisher’s exact tests were used to analyze the difference in ordinal values, and the Mann-Whitney U test was used to analyze the difference between ordinal and numeric values to compare the group that scored 20 points or higher with the group that scored less than 20 points on EAT-26. The independent variables that were incorporated in this study were demographic characteristics, dietary habits, and diet behavior. All items were analyzed as potential determinants of DEAs. Descriptive and analytical statistics including univariate and multivariate analysis were performed. The variables were considered for multivariate analysis if their univariate p value was less than 0.05. We estimated the association of these factors to DEA and compared the groups 20 points
| Variables                              | Total Frequency | N=483 Percent | EAT26 Score<=20 Frequency | N=483 Percent | EAT26 Score>20 Frequency | N=483 Percent | P-value       |
|----------------------------------------|----------------|---------------|--------------------------|---------------|--------------------------|---------------|--------------|
| Age (%)                                | Median (IQR)   | 19 (19–21)    | 19 (19–21)               | 19 (18.75–20) | 0.327                    | Mann-Whitney U test |
| Major (%)                              |                |               |                          |               |                          |                |              |
| Nursing                                | 318 (65.8)     | 298 (65.2)    | 20 (76.9)                | 0.246         | Pearson’s chi square test |
| Physical therapy                       | 12 (2.5)       | 13 (2.8)      | 0 (0.0)                  |               |                          |                |              |
| Occupational therapy                   | 50 (10.4)      | 77 (16.8)     | 0 (0.0)                  |               |                          |                |              |
| Midwifery                              | 102 (21.3)     | 59 (12.9)     | 6 (21.3)                 |               |                          |                |              |
| University year (%)                    |                |               |                          |               |                          |                |              |
| 1st grade                              | 201 (41.6)     | 191 (41.8)    | 10 (38.5)                | 0.570         | Mann-Whitney U test      |
| 2nd grade                              | 141 (29.2)     | 130 (28.4)    | 11 (42.3)                |               |                          |                |              |
| 3rd grade                              | 82 (17.0)      | 77 (16.8)     | 5 (19.2)                 |               |                          |                |              |
| 4th grade                              | 59 (12.2)      | 59 (12.9)     | 0 (0.0)                  |               |                          |                |              |
| Height (cm)                            | Median (IQR)   | 158.0 (155.0–163.0) | 158.0 (155.0–162.75) | 156.5 (153.85–163.125) | 0.502 | Mann-Whitney U test |
| Weight (kg)                            | Median (IQR)   | 55.1 (50.6–61.1) | 54.9 (50.6–61.0) | 55.9 (51.6–66.875) | 0.239 | Mann-Whitney U test |
| BMI                                     | Median (IQR)   | 22.1(20.4–24.1) | 22.1(20.4–23.95) | 23.6(20.875–25.75) | 0.036* | Mann-Whitney U test |
| thin (<18.5)                           | 28 (5.8)       | 27 (5.9)      | 1 (3.8)                  |               |                          |                |              |
| normal (18.5≤25.0)                     | 374 (77.4)     | 358 (78.3)    | 16 (61.5)                |               |                          |                |              |
| obesity (≥25.0)                         | 81 (16.8)      | 72 (15.8)     | 9 (34.6)                 |               |                          |                |              |
| Number of breakfasts per week (%)      |                |               |                          |               |                          |                |              |
| Everyday                               | 132 (27.3)     | 124 (27.1)    | 8 (30.8)                 | 0.252         | Mann-Whitney U test      |
| 5–6 times per week                     | 61 (12.6)      | 60 (13.1)     | 1 (3.8)                  |               |                          |                |              |
| 3–4 times per week                     | 138 (28.4)     | 134 (29.3)    | 3 (11.5)                 |               |                          |                |              |
| 1–2 times per week                     | 125 (25.9)     | 112 (24.5)    | 13 (50.0)                |               |                          |                |              |
| None                                    | 28 (5.8)       | 27 (5.9)      | 1 (3.8)                  |               |                          |                |              |
| 7–3 times per week                     | 330 (68.3)     | 318 (69.6)    | 12 (46.2)                | 0.017*        | Fisher’s exact test      |
| 2–0 times per week                     | 153 (31.7)     | 139 (30.4)    | 14 (53.8)                |               |                          |                |              |
| Number of meals per day (Last month)   |                |               |                          |               |                          |                |              |
| 1 time per day                         | 91 (18.8)      | 87 (19.0)     | 4 (15.4)                 | 0.690         | Mann-Whitney U test      |
| 2 time per day                         | 228 (47.2)     | 215 (47.0)    | 13 (50.0)                |               |                          |                |              |
| 3 time per day                         | 120 (24.8)     | 114 (24.8)    | 6 (23.1)                 |               |                          |                |              |
| 4 time per day                         | 22 (4.6)       | 22 (4.8)      | 0 (0.0)                  |               |                          |                |              |
| 5 time per day                         | 22 (4.6)       | 19 (4.2)      | 3 (11.5)                 |               |                          |                |              |
| 1–2 times                              | 319 (66.0)     | 302 (66.1)    | 17 (65.4)                | 1.000         | Fisher’s exact test      |
| 3–5 times                              | 164 (34.0)     | 155 (33.9)    | 9 (34.6)                 |               |                          |                |              |
| Dinner Time (Last month)               |                |               |                          |               |                          |                |              |
| 19 o’clock                             | 140 (28.8)     | 124 (27.1)    | 15 (57.7)                | 0.023*        | Mann-Whitney U test      |
| 19–20 o’clock                          | 220 (45.5)     | 215 (47.0)    | 5 (19.2)                 |               |                          |                |              |
| 20–21 o’clock                          | 103 (21.3)     | 98 (21.4)     | 5 (19.2)                 |               |                          |                |              |
| 21–22 o’clock                          | 19 (3.9)       | 18 (3.9)      | 1 (3.8)                  |               |                          |                |              |
| 22–23 o’clock                          | 2 (0.4)        | 2 (0.4)       | 0 (0.0)                  |               |                          |                |              |
| 20–21 o’clock                          | 359 (74.3)     | 339 (74.2)    | 20 (76.9)                | 1.000         | Fisher’s exact test      |
| Do you eat healthy meals?              |                |               |                          |               |                          |                |              |
| Always follow                          | 16 (3.3)       | 12 (2.6)      | 4 (15.7)                 | 0.010*        | Mann-Whitney U test      |
| Often (more than half)                 | 78 (16.1)      | 71 (15.5)     | 7 (26.9)                 |               |                          |                |              |
| Sometimes (Less than half)             | 197 (40.8)     | 189 (41.4)    | 8 (30.8)                 |               |                          |                |              |
| Don’t follow                           | 178 (36.9)     | 171 (37.4)    | 7 (26.9)                 |               |                          |                |              |
| I don’t know                           | 14 (2.9)       | 14 (3.1)      | 0 (0.0)                  |               |                          |                |              |
| followed (always and often)            | 94 (19.5)      | 83 (18.2)     | 11 (42.3)                | 0.008**       | Fisher’s exact test      |
| not followed                          | 389 (80.5)     | 374 (81.8)    | 15 (57.7)                |               |                          |                |              |
| Do you have a negative perception of your figure? Yes | 370 (76.6)     | 348 (76.1)    | 22 (84.6)                | 0.474         | Fisher’s exact test      |
| No                                    | 113 (23.4)     | 109 (23.9)    | 4 (15.4)                 |               |                          |                |              |
| Have you dieted?                       |                |               |                          |               |                          |                |              |
| Yes                                    | 114 (23.6)     | 99 (21.7)     | 15 (57.7)                | <0.001***     | Fisher’s exact test      |
| No                                    | 369 (76.4)     | 358 (78.3)    | 11 (42.3)                |               |                          |                |              |
| Are you dieting now?                   |                |               |                          |               |                          |                |              |
| Yes                                    | 39 (8.1)       | 31 (6.8)      | 8 (30.8)                 | <0.001***     | Fisher’s exact test      |
| No                                    | 444 (91.9)     | 426 (93.2)    | 18 (69.2)                |               |                          |                |              |

*p<0.05, **p<0.01, ***p<0.001
or higher and less than 20 points using logistic regression analysis. Potential confounders considered in the multivariate analysis were number of breakfasts (0–2 times, 3–7 times), perception of healthy meals (not followed or followed (always and often)), previous experience of dieting (yes or no), and presently dieting (yes or no). In addition, we estimated the odds ratios and found 95% confidence intervals. Both crude odds ratio and adjusted odds ratio were estimated to show the strength of association. The significance level was set at p < 0.05.

3. Results

Of the 524 participants in the study, we analyzed the complete data of 483 (92%) after excluding the questionnaires with missing data.

Table 1 shows characteristics of the total participants in total and by comparison of the two groups divided by EAT-26 score, “below 20” and “20 or above”.

The median age (IQR) was 19 (19–21) years, with approximately half of the participants (246/483, 50.9%) under 20 years of age. The majority of participants (318/483, 65.8%) were studying nursing. The median BMI was 22.1 (20.4–24.1) and approximately three-fourths (374/483, 77.4%) of the participants had a BMI of 18.5–25. Nearly one-third of the participants (153/483, 31.7%) ate breakfast 0–2 times a week. One-fifth of the students (94/483, 19.5%) followed a healthy meal plan (always and often), and one-fourth of students (114/483, 23.6%) had dieted, while less than one-tenth of the students (39/483, 8.1%) were dieting during the survey period.

3.1 Prevalence of DEAs

Table 2 shows the total score and the scores of each subscale of EAT-26 for all students and for the two groups. The median (IQR) score for all students was 7 (3–12) and the median (IQR) scores for dieting, bulimia, and oral control were 5 (2–8), 0 (0–2), and 1 (0–3), respectively. The results of the study showed that 5.4% (26/483; 95% CI 3.6%, 7.8%) of the participants had DEAs.

3.2 Factors associated with DEA

Table 3 lists the factors independently associated with DEAs. Through multivariate logistic regression analysis, the number of breakfasts per week, perception of healthy meals, previous experience dieting, and current dieting were found to be associated with the higher scoring group.

4. Discussion

4.1 Comparison of prevalence of DEA in other countries

As suggested by Wardle et al., disordered eating is more common among women, and this is the first study to investigate DEAs and related risk factors among female university students in Ulaanbaatar, Mongolia using a validated tool. The results of this study reveal that 5.4% of the participants were found to have DEAs. However, compared with similar studies among women in countries such as Taiwan (43.2%), Saudi Arabia (35.4%), the US (22.0%), Myanmar (20.6%), Greece (18.0%), Canada (16.0%), Nigeria (12.8%), Malaysia (13.8%), and Japan (12.7%), the prevalence of DEAs among Mongolian university students was lower. This

Table 2 Total scores and scores of each subscales of EAT-26 among university students in Ulaanbaatar, Mongolia 2016 (N=483)

| Items                                | Total     | N=483 | EAT26 Score <20 | N=457 | EAT26 Score >20 | N=26 | P-value (Mann-Whitney U test) |
|--------------------------------------|-----------|-------|-----------------|-------|-----------------|------|-----------------------------|
| Number of breakfasts                 | Med (IQR) |       | Med (IQR)       |       | Med (IQR)       |      |                             |
| 0-2 times per week                   | 3 (2-7)   | 329   | 4 (3-9)         | 326   | 5 (4-7)         | 13   | <0.001***                   |
| 3-7 times per week                   | 3 (2-7)   | 154   | 4 (3-9)         | 131   | 5 (4-7)         | 13   | <0.001***                   |
| Follow healthy meal                  | Med (IQR) |       | Med (IQR)       |       | Med (IQR)       |      |                             |
| Not followed                         | 3.304     | 483   | 1.465 ≤ 7.454   | 483   | 3.183           | 18   | 0.009**                     |
| Followed (always and often)          | 4.931     | 483   | 2.195 ≤ 11.076  | 483   | 3.544           | 18   | 0.005**                     |
| Previous experience of dieting       | Med (IQR) |       | Med (IQR)       |       | Med (IQR)       |      |                             |
| No                                   | 6.108     | 483   | 2.461 ≤ 15.160  | 483   | 3.437           | 18   | 0.019                       |
| Yes                                  | Ref       |       | Ref             |       | Ref             |      | 0.015*                      |
| Currently dieting                    | Med (IQR) |       | Med (IQR)       |       | Med (IQR)       |      |                             |
| No                                   | 0.831     | 483   | 0.831 ≤ 2.123   | 483   | 1.333           | 18   | 0.004                       |
| Yes                                  | Ref       |       | Ref             |       | Ref             |      | 0.001***                    |

Table 3 Factors associated with disordered eating attitude, an EAT-26 score of 20 or higher, among university students in Ulaanbaatar

| Factors associated with disordered eating attitude, an EAT-26 score of 20 or higher, among university students in Ulaanbaatar | Total     | N=483 | EAT26 Score <20 | N=457 | EAT26 Score >20 | N=26 | P-value (Mann-Whitney U test) |
|---------------------------------------------------------------------------------------------------------------------|-----------|-------|-----------------|-------|-----------------|------|-----------------------------|
| Number of breakfasts                                                                                                  | Med (IQR) |       | Med (IQR)       |       | Med (IQR)       |      |                             |
| 0-2 times per week                                                                                                    | 3 (2-7)   | 329   | 4 (3-9)         | 326   | 5 (4-7)         | 13   | <0.001***                   |
| 3-7 times per week                                                                                                     | 3 (2-7)   | 154   | 4 (3-9)         | 131   | 5 (4-7)         | 13   | <0.001***                   |
| Follow healthy meal                                                                                                     | Med (IQR) |       | Med (IQR)       |       | Med (IQR)       |      |                             |
| Not followed                                                                                                           | 3.304     | 483   | 1.465 ≤ 7.454   | 483   | 3.183           | 18   | 0.009**                     |
| Followed (always and often)                                                                                           | 4.931     | 483   | 2.195 ≤ 11.076  | 483   | 3.544           | 18   | 0.005**                     |
| Previous experience of dieting                                                                                         | Med (IQR) |       | Med (IQR)       |       | Med (IQR)       |      |                             |
| No                                                                                                                    | 6.108     | 483   | 2.461 ≤ 15.160  | 483   | 3.437           | 18   | 0.019                       |
| Yes                                                                                                                   | Ref       |       | Ref             |       | Ref             |      | 0.015*                      |
| Currently dieting                                                                                                      | Med (IQR) |       | Med (IQR)       |       | Med (IQR)       |      |                             |
| No                                                                                                                    | 0.831     | 483   | 0.831 ≤ 2.123   | 483   | 1.333           | 18   | 0.004                       |
| Yes                                                                                                                   | Ref       |       | Ref             |       | Ref             |      | 0.001***                    |

*p<0.05, **p<0.01, ***p<0.001
discrepancy could be attributed to demographics\textsuperscript{19,21} and cultural differences of the study area to these other countries.\textsuperscript{20,22} Moreover, the instruments used to measure DEAs may also explain the observed variations. The similarity of the current study’s result to China (4.5%),\textsuperscript{9} Korea (5.2%),\textsuperscript{23} Ethiopia (5.9%),\textsuperscript{21} and Brazil 6.9%,\textsuperscript{39} may be due to the common use of EAT-26 as the testing tool. Female participants in all of the studies were of a similar age.

4.2 BMI

The study results presented that 61.5% of the participants in the high score EAT-26 group had normal BMI. Hence, obesity covered 34.6% of the high score EAT-26 group; this is double the proportion of the low score EAT-26 group. However, through the multivariable analysis, the BMI impact for DEAs is not statistically significant. Some previous study findings suggest that both the normal BMI\textsuperscript{38} and overweight, obese BMI ranges suffer from DEAs. Similar findings were observed in our study. However, most of the studies indicated that BMI as a screening method was accurate for detecting DEAs among women.\textsuperscript{23,25,27} A study of nursing students in India suggested that BMI along with body shape concerns might be superior for detecting DEAs, and this combined method could be recommended for detecting DEAs.\textsuperscript{30}

4.3 Number of breakfasts

Our findings revealed that the number of breakfasts related to DEAs was statistically significant. Similar studies that used EAT-26 did not check associations between DEAs and number of breakfasts. It is commonly reported that breakfast is the most important meal of the day.\textsuperscript{39} Repeated breakfast skipping is related to weight gain\textsuperscript{40} and low nutritional adequacy in adult diets.\textsuperscript{39} The benefits of having breakfast have been studied extensively; less meal skipping and eating meals regularly, along with other dietary variables, can lead to greater weight loss.\textsuperscript{41} For this reason, it is imperative to understand the implications of irregular breakfast consumption on DEAs.

4.4 Perception of healthy meals

In the present study, participants’ own perceptions of healthy meals were included among the factors associated with DEAs. Individual understanding of healthy eating is a controversial topic due to the various beliefs related to healthy food consumption; for instance, there is evidence that eating three meals a day is healthy while others prove that increased meal frequency is associated with physiological benefits.\textsuperscript{42} Thus, examining the students’ perception of healthy meals could clarify the potential risk for DEAs.

4.5 Current dieting and experience of going on a diet

One of the interesting discoveries of recent studies was not only current dieting but also preceding dieting practice which suggest the development of DEAs. Across the world, young women in the top half of the weight distribution perceive themselves as overweight and try to lose weight.\textsuperscript{43} Although previous studies have shown that dieting frequency was positively associated with the number and severity of eating disorder symptoms and is key to identifying the DEAs,\textsuperscript{44} it is not clear whether the past experience of dieting can be an associated factor. Hence, further investigation on the topic is suggested.

**Limitation and advantage**

The advantage of our study is that we measured body weight and height instead of gathering self-reported answers to avoid bias.

However, we used only data of School of Nursing from one university in Mongolia; therefore, the study does not represent national data. Since there have been very few investigations on DEAs in Mongolia, extensive research is strongly recommended.

**5. Conclusions**

The prevalence of DEAs is relatively low (5.4%) among Mongolian female students. The number of breakfasts, current and past dieting, and perception of healthy meals were important influential factors in the development of DEAs.

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