Prevalence of Muscle dysmorphia and associated health activities in male medical students in Karachi, Pakistan

Original Article

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ABSTRACT

Background: Muscle Dysmorphia (MD) is a subtype of body dysmorphic disorder (BDD) and is currently classified under anxiety disorders (subheading: Obsessive-compulsive disorder) in DSM 5. MD is hypothesized to affect the self-esteem and social outlook of the younger generation. MD shows a higher rate in males and may influence their self-confidence rendering them more prone towards using steroids, supplementary proteins and other drugs to alter their physical outlooks as shown in previous studies. This problem has been on the rise lately due to revolutionary advancement in the media and film industry and the abrupt changes about the standards of physical good looks and body shapes. With the lack of studies done in our population, our study will be helpful to consider the prevalence of the disease in our setting and increase awareness in the general public and clinicians. We hope to help clinicians/ therapists find better options in managing the disease.

Materials: We performed a cross-sectional study with a sample size of 246 medical school students in Karachi to collect data through self-administered questionnaires. We used the DSM 5 criteria for the diagnosis of BDD and additional questions on the presence of MD. Nutritional habits, exercise routines, use of supplements and drugs were also obtained for exploratory analysis.

Results: Our study predicted the prevalence of MD to be 25%. Other main findings included statistical significant associations between MD and the thoughts and practice of steroid use for muscularity.

Conclusion: MD is an underdiagnosed and often unrecognized disease that we believe has significant consequences for the young male population. Further work is needed on this in our part of the world. Our research, we believe, can be a stepping stone for further studies that would incorporate wider populations.[1,2]

Key Words: *Muscle Dysmorphia (MD)*, *DSM 5, Medical Students, Male, Body Dysmorphia Disorder (BDD)*

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INTRODUCTION

Muscle dysmorphia (MD) is a DSM 5 disease characterized by feelings of inadequacy with regards to muscle size in people with an average build. There is an excessive drive for muscularity in patients with MD, which is significantly out of proportion to any need.[1,2] It is a subtype of body dysmorphic disorder (BDD) and is currently classified under anxiety disorders (subheading: Obsessive-compulsive disorder) in DSM 5. MD has been the centre of much debate in the past. It was originally classified under somatoform illnesses under DSM IV. However, current insights and more recent data have shown similar features to OCD.[2-4] The basis for this study rests in the hypothesis that MD can have lasting effects on the self-esteem and social outlook of a population of young men.[5,6] We also hypothesized that the prevalence of the disease is particularly high in young male adults; hence, the study was tailored towards a sample of male medical students. This was well supported by previous literature as it is reported that women have a higher prevalence of eating disorders while men demonstrate higher rates of MD. Previous literature has also shown a much higher rate of substance and steroid abuse in patients with MD.[7] Additionally, patients with MD are seen to

consume well over their daily requirements of dietary protein.[8] Furthermore, there is a greater reliance on dietary supplements to obtain extra protein content.[9]

Rationale for this article

Tod D (2016) reviewed the current insights on MD and found that it continues to be a poorly understood disease, and there is a lack of robust studies done on the topic.[3] Hence, to add to the limited literature on MD, the authors feel the need to explore the prevalence and potential health concerns that it may cause.

METHODOLOGY

We used a cross-sectional study design to assess the prevalence of Muscle Dysmorphia in male medical students aged 19-24 years of age and enrolled in the Aga Khan University and Sindh Medical College. Along with calculating prevalence, we evaluated the use of performance-enhancing drugs/steroids and dietary supplements in the study participants, along with their awareness of protein consumption. These variables were explored in correlation with muscle dysmorphia in the final results discussed below. The study spanned over a period of 5 weeks from March till April 2017.

Data Collection

DSM 5 criteria along with queries about thoughts regarding the use or use of steroids, protein supplements and the time spent exercising. Subjects were approached in their respective medical college campuses and courtyards during academic hours. Prior permission had been obtained from both the institutions. Prior to the administration of the questionnaire, consent from the subjects was obtained, and a brief introduction of the study was concurrently given. The questionnaires were then collected in a questionnaire box to ensure anonymity. The approximate time taken to fill in the questionnaire was ten minutes. All participants had a chance to refuse or leave midway filling of the questionnaire. However, no such problems were faced. Convenience sampling method was used.

Sample Size

The sample size was calculated to be 246 on OpenEpi Software, using the estimate of population size to be 100,000 male medical students due to lack of data on the exact number of male medical students aged 19-24 in Karachi. The predicted hypothesis of the outcome factor is 20%, Confidence Interval is 95%, and the accepted margin of error is 5%.

Questionnaire

In keeping with the objectives of the study, we drafted a questionnaire. The questionnaire was divided into three sections:

- Section 1: This section focused on the subject's demographics, including age, name of institution and area of study.
- Section 2: This section included the DSM 5 scoring criteria for body dysmorphic disorder. The DSM 5 scoring criteria consist of 5 parts with each part rated on a five-point scale. This was then used to calculate a total score and an average score for each subject. The average score was then interpreted as 0= None, 1= Mild, 2= Moderate, 3= Severe and 4= Extreme
- Section 3: This section included general questions related to the subject's usage of steroids, protein supplements and hours spent in physical training.

Data entry and quality assurance check

Each researcher was allocated a set of serial numbers, and the filled questionnaires were then manually entered into a questionnaire document on EpiData. Data were analyzed using the data entry program SPSS 21. Data collected from the questionnaires were entered and edited manually. Methods used to prevent data entry errors included double entry and validation following data entry and data analysis screening for outliers during data analysis. Checks were applied on OpenEpi software. Data were cleaned by running frequencies and was then double-checked and entries, peer-reviewed.

Informed consent

The informed consent included a brief description of the research topic, along with its objectives to establish informed consent. To further increase the comfort of the subject during filling of the form, anonymity was maintained by keeping the disclosure of identities optional. The responses were secured immediately after collection without being viewed to maintain confidentiality.

Ethical consideration

The study was approved by Aga Khan University ethical review committee in April, 2017.

RESULTS

Our study population consisted of 252 male medical students between the ages of 19-24. Mean age was 21.67, with the most frequent age being 21 (23.8%), as indicated in table 1.

Tables 2-5 show the findings of DSM 5 criteria used in our questionnaire. The individual scores of each of these components were used to calculate an average score for all the study participants. Table 2 demonstrates findings for hours occupied per day with thoughts of muscle underdevelopment. 152 (60.3%)

Age	Frequency (n=252)	Percentage (N= 100%)
19	29	11.5 %
20	24	9.5 %
21	60	23.8 %
22	54	21.4 %
23	57	22.6 %
24	28	11.1 %

Table 1: Background characteristics of study participants

Hours occupied per day with thoughts of muscle underdevelopment		Frequency (n= 252)	Percentage (N= 100%)
None	Grade 0	152	60.3 %
Less than 1 hour per day	Grade 1 (mild)	71	28.2 %
1-3 hours per day	Grade 2 (moderate)	27	10.7 %
3-8 hours per day	Grade 3 (severe)	2	0.8 %
More than 8 hours per day	Grade 4 (extreme)	0	0 %

Table 2: Frequency of average amount of time occupied with thoughts of muscle underdevelopment amongst subjects.

Difficulty faced in controlling thoughts of muscle development		Frequency (n= 252)	Percentage (N= 100%)
Complete control	Grade 0	154	61.1 %
Usually able to control thought or behavior	Grade 1 (much control)	60	23.8 %
Sometimes able to control thoughts or behavior	Grade 2 (moderate control)	29	11.5 %
Infrequently able to control thoughts or behavior	Grade 3 (little control)	7	2.8 %
Unable to control thoughts or behavior	Grade 4 (no control)	2	0.8 %

Table 3: Frequency of degree of distress caused by thoughts of muscle underdevelopment amongst subjects.

Degree as to which thoughts of muscle underdevelopment cause subjects to avoid anything, going anywhere or being with anyone		Frequency (n= 252)	Percentage (N= 100%)
No avoidance	Grade 0	167	66.3 %
Occasional avoidance	Grade 1 (mild)	59	23.4 %
Regular avoidance	Grade 2 (moderate)	19	7.5 %
Frequent and extensive avoidance	Grade 3 (severe)	7	2.8 %
Near complete avoidance or housebound	Grade 4 (extreme)	0	0 %

Table 4: Frequency of degree to which thoughts of muscle underdevelopment cause subjects to avoid anything, going anywhere or being with anyone.

Degree to which thoughts of muscle development interferes with school, work, social or family life		Frequency (n= 252)	Percentage (N= 100%)
No avoidance	Grade 0	175	69.4 %
Slight interference	Grade 1 (mild)	56	22.2 %
Definite interference with functionality but manageable	Grade 2 (moderate)	17	6.7 %
Substantial interference	Grade 3 (severe)	4	1.6 %
Near total interference or incapacitated	Grade 4 (extreme)	0	0 %

Table 5: Frequency of degree to which thoughts of muscle development interferes with school, work, social or family life amongst subjects.

Average score	Frequency (n= 252)	Percentage (N= 100 %)
0 (None)	155	61.5 %
1 (Mild)	69	27.4 %
2 (Moderate)	27	10.7 %
3 (Severe)	1	0.4 %
4 (Extreme)	0	0 %

Table 6: Average score frequency amongst subjects.

Subjects with some degree of muscle dysmorphia		Subjects with no muscle dysmorphia	
Number (n= 252)	**Percentage (N= 100 %)**	**Number (n= 252)**	**Percentage (N= 100 %)**
63	25 %	189	75 %

Table 7: Prevalence of muscle dysmorphia amongst subjects

Health activities n= 252		
Thought of using steroids or performance enhancing drugs		37 (14.7%)
Ever used steroids or performance enhancing drugs		17 (6.7%)
Ever used dietary supplements		90 (35.7%)
Awareness regarding daily protein consumption		99 (39.3%)
Hours spent exercising in a week	Less than 1 hour	60 (23.8%)
	1-2 hours	46 (18.3%)
	3-4 hours	42 (16.7%)
	More than 4 hours	104 (41.3 %)

Table 8: Frequency of health activities amongst subjects

	Subjects with muscle dysmorphia (n=63)		Subjects without muscle dysmorphia (n=189)		Pearson Chi-Square test	Degrees of freedom	P value
	Yes	No	Yes	No			
Thought of steroid use/ performance enhancing drugs	23 (36.5%)	40 (63.5%)	14 (7.4%)	175 (92.6%)	31.942	1	0.000
Ever used steroids/ performance enhancing drugs	12 (19 %)	51 (81%)	5 (2.6%)	184 (97.4%)	20.206	1	0.000
Ever used dietary supplements	27 (42.9%)	36 (57.1 %)	63 (33.3 %)	126 (66.7%)	1.867	1	0.172
Awareness regarding daily protein consumption	30 (47.	33 (52.4%)	69 (36.5	120 (63.5%)	2.446	1	0.118

Table 9: Frequency of health activities based on presence or absence of muscle dysmorphia amongst subjects.

Presence or Absence of Muscle dysmorphia	Hours in a week spent exercising (n= 252)			
	Less than 1 hour	1 to 2 hours	3 to 4 hours	More than 4 hours
Yes (n=63)	14 (22.2%)	8 (12.7%)	10 (15.9%)	31 (49.2%)
No (n=189)	46 (24.3%)	38 (20.1%)	32 (16.9%)	73 (38.6%)

Table 10: Hours spent exercising per week based on presence or absence of muscle dysmorphia amongst subjects.

respondents were not occupied with thoughts of muscle underdevelopment throughout the day. 71 (28.2%) respondents spent less than 1 hour per day thinking about muscle underdevelopment, classified as mild. Only 2 (0.8 %) respondents were pre-occupied with the thought of muscle underdevelopment spending between 3 till 8 hours per day, classified as severe. No respondents spent more than 8 hours per day, classified as extreme.

Table 3 presents findings for the difficulty faced in controlling thoughts of muscle underdevelopment, 154 (61.1%) respondents were in complete control of their thought or behaviour, 60 (23.8%) were usually able to control their thoughts or behaviour, categorized as grade 1, 29 (11.5%) respondents were able to moderately control their thoughts or behaviours, categorized as grade 2 and 7 (2.8%) respondents had little control over their thoughts or behaviours, categorized as grade 3. No respondents lost control over their thoughts or behaviours, classified as extreme.

Table 4 demonstrates findings for the degree as to which thoughts of muscle development cause subjects to avoid anything, going anywhere or being with anyone; 167 (66.3 %) respondents reported no avoidance pertaining to thoughts of muscle underdevelopment, 59 (23.4 %) were mildly caught with thoughts of muscle under development, leading to occasional avoidance, classified as grade 1, 19 (7.5 %) respondents were moderately thinking about muscle underdevelopment, causing regular avoidance and categorized as grade 2 and 7 (2.8 %) respondents were frequently and extensively avoiding anything, going anywhere or being with anyone, categorized as severe or grade 3. No respondents selected near-complete avoidance of being housebound due to thoughts of muscle underdevelopment.

Table 5 demonstrates findings for the degree to which thoughts of muscle development interferes with school, work, social or family life amongst study participants; 175 (69.4 %) respondents reported no avoidance pertaining to thought interference with school, social, work or family life, 56 (22.2 %) reported being mildly caught with thoughts of muscle under development, leading to slight interference, categorized as grade 1, 17 (6.7 %) respondents were moderately thinking about muscle underdevelopment, causing definite interference with functionality but manageable, categorized as grade 2 and only 4 (1.6 %) respondents reported facing substantial interference, categorized as severe or grade 3. No respondents responded with grade 4 or near-total interference leading to incapacitation.

The average score is summarized in table 6. One hundred and fifty five (61.5%) respondents had an average score of 0, 69 (27.4) respondents had an average score of 1, 27 (10.7%) respondents had 2 and only 1 (0.4%) respondent had an average score of 3. No subject in our study sample had a calculated total score of 4. Average scores were calculated for each subject individually based on the DSM 5 criteria demonstrated in tables 2-5.

The average scores, presented in table 6, were incorporated with part three of our questionnaire, which asked whether the subjects had thoughts of muscle inadequacy. Muscle Dysmorphia was then diagnosed in those subjects who had an average score of 1 and above as well as a positive response to the above question. The findings are summarized in table 7, 63 subjects (25%) were diagnosed with Muscle dysmorphia using the above-mentioned protocol.

Table 8 shows the frequency of all study subjects and their healthy activities, 37 (14.7 %) respondents had thought of using steroids or performance-enhancing

drugs, while 17 (6.7 %) respondents admitted to having personally used them, 90 (35.7 %) respondents claimed to use dietary supplements, while 99 (39.3 %) respondents were aware of their protein intake.

Table 9 divides the subject population by the absence or presence of MD. It then looks at the frequency of each health activity. As shown by the table, 23 (36.5 %) subjects diagnosed with MD admitted to thoughts of using steroids or performance-enhancing drugs. While only 14 (7.4 %) subjects who did not have MD admitted to the same thoughts. 12 (19 %) MD-positive subjects used steroids and performance-enhancing drugs, while only 5 (2.6 %) MD-negative subjects admitted to doing the same. Both these differences in the thoughts and use of steroids between the two groups was statistically significant when the Chi-square test was run (p-values<0.05). 27 (42.9 %) of MD-positive subjects and 63 (33.3 %) MD-negative subjects admitted using dietary supplements. 30 (47.6 %) MD positive and 69 (36.5 %) of MD-negative respondents were aware of their total dietary protein. However, when the differences in these two variables between the MD-positive and -negative groups were evaluated, they were found to be statistically insignificant as the Chi-square test yielded a p-value higher than 0.05.

Table 10 compares the number of hours a week spent in the gym between the two groups. In both groups, most subjects spent more than 4 hours in the gym per week. Those with MD spent more hours in the gym in this subcategory however in all other subcategories the subjects without MD were spending more time in the gym.

DISCUSSION

Twenty-five percent of our sample population was found to have muscle dysmorphia. Majority of the positive cases were found to be mild. More specifically, 25% of subjects described the distress caused by this disease as slightly disturbing, 23.8 % admitted that they were usually able to control their thoughts of muscle underdevelopment, 23.4% avoided doing anything only occasionally, and 22.2% of subjects admitted that it slightly interfered with their school, work, social or family life. Therefore, it can be concluded that the majority of those labelled positive for muscle dysmorphia only exhibited a rather mild form of the disease. This can be backed by the average score frequency, which a score of 1 (mild) had the second-highest frequency (27.4%) following 0 (none). The prevalence of MD in our study comes out to be higher than what other studies have suggested.

Compte et al.[10] reported a prevalence of 6.99% in their sample of male medical students in Buenos Aires. Similarly, Campagna reports a prevalence of 12.7% in males and 4.2% in females.[11] We hypothesize that the relatively high level of prevalence in our population[4] might be due to the severe lack of mental health facilities in our part of the world. Studies show the role of media in changing the ideals of what a young male considers to be the target goal with regards to physical appearance.[12] The desire to be lean and slim has changed to that of being larger and stronger in adolescents.[13] There is also a loose link between anthropometric measurements of subjects and the presence of MD. Obesity correlates positively with MD, as does mesomorphy.[14] The body dysmorphia disorder questionnaire has also been critically analyzed and is found to be an effective screening tool.[15,16] However, there is an absence of a widely accepted diagnostic tool.

Our study explored other variables that included thoughts of steroid use, usage of steroids, usage of supplements and awareness regarding daily protein consumption. Statistically significant associations were found for both thoughts of and usage of steroid use. When we talk about dietary supplementation and protein consumption awareness, we saw higher rate among subjects with the disease, but neither was statistically significant. Subjects with MD also on average spent more time in the gym and in physical activity. Our results show a lot of interesting data with possible implications. Our prevalence value of 25 % contrasts with previous studies which showed it to be in the range of 7 to 13 %. Additionally, it shows a higher prevalence in a younger, more at-risk population. There are statistically significant associations with both thoughts and actual usage of steroids. Both showed very high rates, and this highlights the future implications of the disease. Such high values cannot be ignored and hope to serve as a platform for both future research and societal and clinical awareness.

Although no statistically significant associations were found for other variables in the study, we found baseline rates of dietary supplementation and awareness of protein consumption to be high even in the general population. This may mask our data from showing the trend in our positive cases. The study hopes to highlight MD as a growing health concern and one that affects the young health of our population in specific. Mass media consumption and societal paradigm shifts had left the medical and overall community with a disease more prevalent than ever before which was once thought to be negligible.

Strengths and Weaknesses

The strengths of our study include a good sample size and response rate. Our definition of MD was robust and served to make sure there was no over-reporting of the disease. Additional questions were included to make our criteria even stronger. The study is the first of its kind in our population. Additionally, our results are meaningful and have implications for our population. Lastly, our topic is a current day issue.Weaknesses of this study include limited population. The validity to be extended to the general population is not profound. Our population is also focused on a specific socio-economic class. Although the authors hope to strengthen further the definition of MD used by other studies, it is a new definition and not one widely used. Lastly, our study does not take into consideration any confounders.ngths of our study include a good sample size.

CONCLUSION

MD is an under-diagnosed and under-reported disease. The authors sought out to highlight and mainstream the disease in an effort to show the increasing prevalence and possible health implications. We found the value to be within 5 % of our expected outcome of 20 % and found statistically significant associations with MD and steroid abuse. The long-term outcomes of our data are vast and should be explored through further studies. We hope our data will serve as a pilot for future research.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest.

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