**Sexual functioning and body image among bariatric surgery candidates: A comparison between Israeli Jewish and Arab women**

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**Abstract**
Background: The rate of obesity has risen in the last four decades and is now recognized as a pervasive health problem throughout the world. Obesity involves many health risks as well as social, psychological and other consequences. Studies show a negative effect of obesity on the musculoskeletal system, manifested as physical limitation and impairment of daily functioning including sexual functioning. Additionally, obesity has a negative impact on a person's social and cultural skills and self-image, all of which affect quality of life.

Aim of the study: To examine the effect of cultural background on body image, sexual functioning, daily functioning and participation in activities (such as leisure, sports, childcare and home care) in women of two ethnic groups seeking bariatric surgery due to overweight.

Study population: A group of 35 female Israeli-Arab bariatric surgery candidates and a group of 35 Israeli-Jewish candidates, (mean age of the Arab vs. Jewish was 37.7±9.3 years vs 38.7±10.8 years respectively) with a BMI>40 or with a BMI>35 and comorbidities (such as diabetes, hypertension, dyslipidemia).

Research method: Cross-sectional study. Data collection by self-report questionnaires assessing sexual functioning, body image, participation in daily activities and cognition, at a specific point in time – prior to bariatric surgery.

Results: No statistically significant difference between the two groups in age, level of education, (57% of the Jewish participants had a post-secondary education, compared with 48% of the Arab group). A significant difference in the mean BMI index was found, The Jewish group had higher BMI than the Arab group. (43.11Kg/m² vs. 40.48Kg/m², p = 0.027). Most Jewish women were working (91%) compared to 69% of Arab women. this difference is statistically significant (p = 0.034).

**In the area of ​​sexual functioning**, the two groups reported a decrease in sexual desire with no significant difference between them. A higher proportion of Jewish women initiate sexual intercourse compared to Arab women (p = 0.042). Arab participants expressed a higher rate of dissatisfaction with sexual relations than Jewish women (p = 0.003).

**In the field of daily participation**, there is a significant difference between the two groups in participation in cultural events, classes, child care and in the field of personal care, with Jewish women reporting more frequent use of cosmetics, pedicure and manicure (p = 0.041). In addition, it was found that Jewish women enjoy more sports activities such as a gym, exercise class or yoga (p=0.02).

**In the field of cognition**, there was a statistically significant difference (p = 0.048) in the number of Jewish vs. Arab women with good memory skills (80% vs. 60%). however no association was found between the memory index and BMI or education. "External image" was the reason for surgery for 63% of Arab women compared to 48% of Jewish women. "Sexuality" was the main reason before the operation for 50% of Arab women compared with 31% of Jewish women. "Quality of life" was indicated as the main reason for surgery among 79% of Arab women and 86% of Jewish women, with no statistically significant difference between the two groups. In the group of Arab women, a statistically significant relationship was found between "sexuality" as the reason for surgery and sexual desire, satisfaction with having sex, body image and expectations for a change in the quality of sex. Among the Jewish women, a statistically significant relationship was found between "sexuality" as the reason for surgery and sexual desire, the frequency of sexual intercourse, and satisfaction with sexual intercourse.

Conclusions: There are differences in body image perception, sexual functioning and daily participation in activities between Arab and Jewish women, with Arab women less likely to be employed, less involved in cultural events, more impaired memory and less likely to initiate sexual relations. Cultural characteristics play a significant role in shaping behavior in general, and particularly in obese women.

Keywords: obesity, bariatric surgery, sexual functioning, ethnic differences, day-functioning, Arab, Jewish.

**Background**:

 Obesity, a worldwide health phenomenon, is determined by measuring body mass (kg/m²) (BMI). A normal value is in the range of 25-30. People with a BMI≥30 are defined as obese and those with a BMI>40 are defined as morbidly obese (Garrow, 1985). The increase in the obesity rate of the population is accompanied by an increase in many health risks and implications concerning quality of life. Studies show a negative effect of overweight on the musculoskeletal system, which can lead to impaired quality of life, decreased social and environmental participation, and subsequent emotional difficulties (Tomilson, 2015). In addition, obesity has been found to affect cognitive function, especially memory. Studies have shown that obesity in early adulthood triples the risk of cognitive decline in advanced age (Keren, 2012).

Bariatric surgery is now considered to be the most relatively effective solution for treating obesity and reducing the physical complications involved. The last decade has seen a dramatic increase in the number of bariatric surgeries performed throughout the world, as well as in Israel. The surgery significantly helps people with obesity to lose weight and improve their mobility, quality of life and survival. The leading types of bariatric surgery are the gastric bypass and gastric sleeve (Israel Medical Association, 2017).

**Participation:**

 The World Health Organization (WHO) has defined 'participation' as "human involvement in life situations". According to the new International Classification of Functioning, Disability and Health (ICF), the definition of participation includes: studies, knowledge acquisition, tasks, general life requirements, communication, mobility, self-care, home participation, inter-personal relationships, work and community, social and civic activities. The main idea in 'participation' is the involvement of the individual in various activities (Law, 2002); these activities are organized and receive individual and cultural value and significance. Activities are endeavors in which we participate and they form part of our identity.

**Activities and sexual functioning:**

Activities of Daily Living (ADL) is defined as activities aimed at personal body care, also called basic activities of daily living (BADL) or personal activities of daily living (PADL) such as: bathing, dressing the upper and lower body, feeding oneself, functional mobility and transitions, treatment with personal accessories, personal hygiene and sexual activity (Aota, 2002). One of the basic functions in human life is sexual function; Aota (2014) defined sexual function as one of the ADL functions that enable self-satisfaction.

 "Body image" or the way we perceive our body, is described in mental health terms as the individual's mental image, his desires and emotions. Body structure, body weight and measurements are among the qualitative components of body image. Satisfaction with external appearance, such as approval with the expression of the "self" in other areas, is a necessary condition for enjoying relationships and sexuality. In their work on women's self-satisfaction, Markey, Markey & Birch (2004) showed that body weight has a significant effect on their self-image, and that there is a clear correlation between obesity and depression.

**Multiculturalism:**

 Israeli society is composed of a unique and dominant culture, and a variety of subcultures on a religious, ethnic and nationalistic basis (Florian, 1993). This multiculturalism characterizes the life of each of the sectors. There are socio-economic, socio-cultural and socio-political differences between the Jews and Arabs living in Israel. Characteristics that affect a person's participation and social fabric are perceived as basic living situations such as education and income, socio-economic status, education, family structure and values, a sense of choice and control, and an enabling and inviting environment.

 In her article, Law (2002) emphasizes how the expectations of the culture to which a person belongs affects his/her occupation, participation and areas of activity in daily life, and that non-participation may cause social distance which is one of the signs of loneliness.

 Many scholars emphasize that the majority of the Arab population in Israel is characterized by traditional, patriarchal and authoritarian family values, as well as a preference for group and family goals over the goals of the individual (Haj Yehia, 1994 Haj-Yehia, 2000; Haj-Yehia, 2002;). Accordingly, the individual's behavior is determined by the goals of the collective, family, village or clan more than the goals of the individual. In contrast, most of the Jewish population in Israel adopts Western European values ​​emphasizing the importance of the nuclear family and the independence of its members (Haj Yehia, 1994, 2000, 2002).

 Al-Haidri (2003) defined patriarchy as the dominance of men and the inferiority of women in the public and private spheres. Arab culture, and especially Muslim culture, has shaped the meaning of the body among women and continues to shape their sexual behavior (Shalvi, 2008). A woman's dignity, according to social norms, refers to her behavior, thoughts, and feelings in all that is relevant to sexuality and is expressed, among other things, in maintaining virginity while unmarried. Thus, the concept of sexuality becomes synonymous with family honor (Hassan, 1999). Women in Arab society are defined as dependent on one man - her father or husband. Even the most powerful woman is enclosed within patriarchal boundaries. Despite this difficulty, Arab women struggle within their culture and religion, fighting the patriarchal authority (Abu Rabia, 2005).

**Cognitive functioning and cognition:**

 Cognition is defined as the individual's ability to acquire and use knowledge for the purpose of adapting to the requirements of one's environment. This includes memory, attention, motor-visual organization, sequence, visual perception, language, and categorization (Eyal and Reichenthal, 2015). In the present study, we will focus on memory, defined as an intellectual process and a system for preserving knowledge and retrieving it later on (Baddeley, 1990). Changes in cognitive functions and especially memory are personal and can result from several factors: stress and tension, feelings of sadness and depression, various disease states (diabetes, hypertension and heart disease), use of medications and sleep problems (Eyal and Reichenthal, 2015).

 Studies have shown that about 25% of the bariatric patient population has significant levels of neurocognitive impairment, and about 40% have a more complex cognitive impairment such as learning and memory, attention and managerial functions (Gurneet, 2017). Obesity has been found to be associated with poor cognitive function in different ways and dependent on the age group. Studies have shown that a high BMI index in mid-life people is associated with a higher incidence of dementia (Abdulaziz, 2018).

**Aim of the study**: The aim of the study is to examine the differences between Israeli Jewish and Arab women who are candidates for bariatric surgery, in the context of socio-demographic characteristics (education, marital status, occupation) as well as participation in daily activities, cognition, sexual function and body image, prior to deciding on bariatric surgery.

**Method**

**Research population and research methods**:

 The study was conducted in the Department of Surgery at the Galilee Medical Center, Israel, after approval by the Institutional Review Board (Helsinki Committee). In a period of two years (2018-2019), seventy successive Arab and Jewish women were recruited (Arab N = 35, and Jewish N = 35). Data were collected from these 70 women who passed the department's pre-surgical committee and signed an informed consent form.

**Research tool:**

 The participants were asked to complete several self-report questionnaires:

1) Participation questionnaire for adults: Developed in 2003-2004 by Prof. Tal Jarus (2006), this questionnaire assesses the degree of participation in daily activities as well as the degree of enjoyment. The questionnaire includes 44 occupations divided into eight categories in the areas of: home and family, recreation, activities with children, study and work activities, physical activity/sports, self-care, and other tasks.

 2) Sexuality Questionnaire: The Female Sexual Function Index (FSFI) Abbreviated: Developed by Rozen et al (2000), this questionnaire was translated into Hebrew in 2015 and validated at Sheba Medical Center in Israel for a research study examining improvement of sexual function among bariatric-surgery patients (David, 2015). The purpose of the questionnaire was to assess difficulties in various aspects of sexual function in women. The questionnaire includes 19 items divided into six areas: sexual desire, sexual arousal, lubrication, orgasm, sexual satisfaction, sexual pain.

3) Daily functioning questionnaire: The Functional Independence Measure (FIM): Developed in 1986 by Granger, Hamilton, Keith, Zielezny & Sherwin, this questionnaire was translated into Hebrew and adapted for use in rehabilitative and geriatric settings (Ring, 2001). Its aim is to examine the individual's functional state, especially the ability to dress one's lower body - trousers, socks and shoes. The questionnaire addresses personal function, mobility, sphincter control, bathing and dressing with separate reference to upper and lower torso, communication and cognitive function.

4) Cognitive diagnosis: COGNISTAT test was developed in 1983 by Kiernan, Mueller & Langston. Another edition was published in 1995 and translated into Hebrew in 1997 (Kitzoni, 1998). This is an identification test that evaluates cognitive functioning and its level in five main areas: language, visual-motor organization, memory, calculation and thought processes.

**Results**

Table No. 1 compares the education, age and BMI variables between the two study groups.

**Table 1- Distribution of variables of education, age, BMI in the study groups.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **Nationality** | **Responders** | **Median** | **Range** | **Mean** | **SD** | **t-test** |
| **Education** | **Jewish** | **35** | **13** | **11-21** | **13.82** | **2.18** | **1.39****p=0.339** |
| **Arab** | **35** | **12** | **1-20** | **12.77** | **3.87** |
| **Age** | **Jewish** | **35** | **39** | **18-59** | **38.71** | **10.75** | **0.40****p=0.687** |
| **Arab** | **35** | **40** | **19-52** | **37.74** | **9.31** |
| **BMI** | **Jewish** | **35** | **41.55** | **33.4-57** | **43.11** | **5.04** | **2.56\*****p=0.027** |
| **Arab** | **35** | **40.51** | **33.8-47.3** | **40.48** | **3.37** |

The average number of education years in the Hebrew-speaking group was 13.82 years vs. 12.77 years in the Arabic-speaking group, with no statistically significant difference between the two groups (t = 1.39, p = 0.339). No statistically significant difference was found between the groups with respect to average age; the range was 18-59 years and 19-52 years in the Jewish and Arab groups, respectively. The average BMI in the Jewish group was 43.1 kg/m2  vs. 40.4 kg/m2 in the Arab group, representing a significant difference between the two groups (t = 2.56, p = 0.027).

**Table 2 - Comparison of background variables between the two groups.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Jews** | **Arabs** | **Entire sampling** |  |
| **Socio-demographic variables** | **Respondents** | **%** | **Respondents** | **%** | **Respondents** | **%** | **p** |
| **Employed** | No | 3 |  9% | 11 | 31% | 14 | 20% | 0.034 |
| Yes | 32 | 91% | 24 | 69% | 56 | 80% |  |
| **Education** | Maximum 12 years | 15 | 43% | 20 | 57% | 35 | 51% | 0.339 |
| Higher education | 20 | 57% | 15 | 43% | 35 | 49% |  |
| **Comorbidities** | No | 24 | 69% | 23 | 66% | 47 | 67% | 0.435 |
| Yes | 11 | 31% | 12 | 34% | 23 | 33% |  |

Table 2 shows that most women from both groups were working (80%). The proportion of working Jewish women (91%) was higher than that of Arab women (69%); this difference is statistically significant (p = 0.034). No statistically significant difference was found between Jewish women and Arab women on the topic of comorbidities; two-thirds (67%) of the participants had no comorbidities (p = 0.435). A borderline significant difference was found in the percentage of smokers, 37.1% of Jewish women vs. 14.3% of Arab women (p = 0.054).

**Table 3 - Difference in sexual function between the two study groups**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Variable |  |  |  |  |  |  |  |
| **Frequency of sexual desire in both groups** |  | All the time | Most of the time | Sometimes | Seldom | Almost never | P.V |
|  | **Jews** | 7% | 3% | 31% | 49% | 10% | 0.39 |
|  | **Arabs** | 10% | 7% | 23% | 40% | 20% |  |
| **How often do you initiate sexual intercourse with your partner?** |  | Always | Often | Seldom | Never |  |  |
|  | **Jews** | 3% | 35% | 48% | 14% |  | 0.042 |
|  | **Arabs** | 0% | 43% | 24% | 33% |  |  |
| **How satisfied you are with sex?** |  | Very | Quite | Reasonably | Not really |  |  |
|  | **Jews** | 14% | 17% | 48% | 21% |  | 0.003 |
|  | **Arabs** | 7% | 0% | 43% | 50% |  |  |
| **Are you ashamed of your body when changing clothes or having sex?** |  | Very much | Quite a bit | Slightly | Not at all |  |  |
|  | **Jews** | **31%** | 21% | 28% | 21% |  | 0.1 |
|  | **Arabs** | **43%** | 27% | 17% | 13% |  |  |
| **How much do you think obesity interferes with sex?** |  | Definitely | Quite a bit | Reasonably | Slightly |  |  |
|  | **Jews** | **48%** | 31% | 3% | 18% |  | 0.33 |
|  | **Arabs** | **57%** | 20% | 10% | 13% |  |  |

Table 3 shows no difference between the Jewish and Arab participants in the frequency of sexual desire (p = 0.39)), with about 60% of participants in both groups reporting a low level of frequency of sexual desire. There is a statistically significant difference between the Jewish and Arab participants in the frequency with which they initiate sexual intercourse (p = 0.042), with Jewish participants initiating sexual intercourse at a higher rate. At the same time, over 50% of Jewish and Arab participants report initiating sexual intercourse only seldom or never. A significant difference was also found between the Jewish and Arab participants in the level of sexual satisfaction (p = 0.003), with Arab participants expressing a higher dissatisfaction with sexual relations compared to Jewish participants. No difference was found, however, between the Jewish and Arab participants in the level of embarrassment with their bodies during sexual intercourse (p = 0.1). Over half of the Jewish participants (52%) and most of the Arab participants (70%) report a high degree of shame regarding their bodies during sexual intercourse, but the difference between the groups was not statistically significant. Also, no statistically significant difference was found between the two groups in the perception of obesity as an interfering factor in sexual relations (p = 0.33). Most of the Jewish (79%) and Arab (87%) participants perceived obesity as a major disruptive factor in sexual intercourse.

When the questions about sexual function are combined, it becomes apparent that the level of sexual function in both groups is low. No significant difference was found between the two study groups (p = 0.12). The reliability level of the variable is acceptable (0.75 = α). No significant difference in body image was found between the two groups (p = 0.12).

**Table 4 - frequency of Distribution of enjoyment of daily activity in the two study groups**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Activity** | **Nationality** | **Detest** | **Don't enjoy** | **Enjoy a bit** | **Quite enjoy** | **Enjoy** | **Enjoy very much** |  |
| Shopping, especially clothes | Jew | **41%** | 6% | 6% | 15% | 15% | 18% | 0.670.50=p |
| Arab | **34%** | 26% | 9% | 6% | 11% | 14% |
| Cultural events, film, concerts, parties | Jew | 7% | 10% | 3% | 10% | 29% | **42%** | 1.750.09=p |
| Arab | 21% | 4% | 17% | 17% | 8% | **33%** |
| Going to a restaurant | Jew | 9% | 6% | 9% | 12% | **33%** | 30% | 0.48-0.63=p |
| Arab | 12% | 6% | 18% | 24% | == | **41%** |
| Walking around malls or the neighborhood | Jew | 8% | == | 13% | 29% | 13% | **37%** | 1.320.19=p |
| Arab | 17% | 14% | 10% | 10% | 21% | **28%** |
| Sleep-over vacation | Jew | 6% | == | == | 14% | 21% | **59%** | 1.770.08=p |
| Arab | 8% | 4% | 18% | 9% | 26% | **35%** |
| Visiting friends | Jew | 6% | 3% | == | 18% | 27% | **46%** | 0.350.72=p |
| Arab | 9% | == | 3% | 16% | 31% | **41%** |
| Hosting | Jew | 9% | 6% | 9% | 14% | 17% | **46%** | 0.34-0.73=p |
| Arab | 6% | == | 12% | 15% | 27% | **39%** |
| Activities with our kids | Jew | 22% | 17% | 11% | **28%** | 11% | 11% | 1.050.29=p |
| Arab | 20% | 13% | 6% | 20% | 19% | **21%** |
| Gym, exercise class, yoga | Jew | == | 7% | 21% | 14% | 21% | **36%** | \*2.400.02=p |
| Arab | **48%** | 43% | 3% | 3% | == | 2% |
| Walking, running, bicycling, swimming | Jew | 6% | == | 25% | 13% | 19% | **37%** | 1.350.19=p |
| Arab | **56%** | 32% | 3% | 3% | == | 6% |

Table 4 gives the frequency of distribution of different activities in the two groups. The level of daily activity is medium, averaging 4.28 on a scale of 1 to 6, (equivalent to a value of 71 on a scale of 1 to 100). The reliability level of the variable is good (α =0.89). It can be seen that in an independent t test no significant difference was found between the two ethnic groups concerning the participation of women in daily activities (p = 0.32).

In the Mann-Whitney test (u), significant differences were found between the two groups in the frequency of participation in three activities: 1- Cultural events, films, concerts and parties (p = 0.022), with participation higher in Jewish women than Arab women.

2- Formal and informal education of the children includes group activities (p = 0.028), with the Jewish women indicating a higher frequency of participation than the Arab women.

3- Cosmetics, pedicure and manicure: A statistically significant difference was found between the two groups (p = 0.041), with Jewish women indicating a higher tendency than Arab women to partake in personal care.

The table shows that close to half of the Jewish participants (47%) and most of the Arab participants (60%) do not enjoy activities that include shopping. Most Jewish participants (71%) and nearly half of the Arab participants (41%) indicated that they do enjoy participating in cultural events. Over half of the Jewish participants enjoy activities that include walking, running, cycling and swimming, in contrast to most of the Arab women (88%) who do not enjoy these activities. There is a statistically significant difference between Jews and Arabs in the level of enjoyment of sports activities such as the gym, exercise class or yoga (p = 0.02).

**Table 5 - Distribution of memory, attention, motor visual organization and arithmetic variables in the two groups**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Nationality** | **Normal** | **Abnormal** | **p.v** |
| Memory | Jews | 80% | 20% | (1-tailed)=0.048 |
| Arabs | 60% | 40% | (2-tailed)=0.097 |
| Attention | Jews | 97% | 3% | (1-tailed)=0.500 |
| Arabs | 97% | 3% | (2-tailed)=1000 |
| Visual-motor organization | Jews | 86% | 14% | (1-tailed)=0.344 |
| Arabs | 80% | 20% | (2-tailed)=0.687 |
| Math | Jews | 80% | 20% | (1-tailed)=0.280 |
| Arabs | 71% | 29% | (2-tailed)=0.559 |

Table 5 shows that 80% of the Jewish women have a normal memory, compared to only 60% of the Arab women. This difference is statistically significant (p = 0.048) in the Mann-Whitney u test (1-tailed). No statistically significant differences were found between the two groups in the measurements of attention, motor visual organization and math. The Mann-Whitney u (2-tailed) test found no statistically significant difference between the two ethnic groups in the degree of memory impairment.

**Table. 6 – Rates of reasons for surgery in the two study groups.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Cause** | **Jews** | **Arabs** | **p.v differential** |
| External image | 48% | 63% | 0.299 |
| Quality of Life | 79% | 86% | 0.506 |
| Comorbidities | 55% | 76% | 0.103 |
| Mood | 38% | 63% | 0.070 |
| Sexuality | 31% | 50% | 0.187 |

Table 6 shows that 63% of Arab women vs. 48% of Jewish women seek surgery for reasons of external body image, a difference that is not statistically significant (p = 0.299). 86% of Arab women reported that the main reason for the surgery was quality of life vs. 79% of Jewish women (p = 0.506). This 'quality of life' dimension was the most prominent reason that most Arab and Jewish women cited as the main reason for deciding upon surgery.

Regarding the index of comorbidities, 76% of Arab women indicated this as a reason for surgery, compared with only 55% of Jewish women (p = 0.103). 63% of Arab women cited mood as the main reason for surgery vs. 38% of Jewish women. Despite the existence of a trend between the two groups, it does not reach statistical significance (p=0.070). No significant difference was found between the two groups regarding the "sexuality" reason; 50% of Arab women and 31% of Jewish women reported that sexuality is the main reason for surgery (p = 0.187).

A significant relationship was found in both Arab and Jewish women, between their choice of "sexuality" as the reason for the surgery and their reference to sexual desire, frequency of sexual intercourse, initiative to have sexual relations with their partner, experience of pain, satisfaction with sexual intercourse and body image. Upon comparison between Jewish and Arab women, a relationship between their choice of "sexuality" as the main reason for surgery and sexual desire (U = 55.5, p = 0.053), frequency of sexual intercourse (U = 53.5, p = 0.042), and satisfaction with sexual relations (U = 45.5, p = 0.006), was found only among the Jewish women.
In the Arab group, a relationship was found between "sexuality" as the reason for surgery and sexual desire (U = 44.5, p = 0.001) in one direction, frequency of sexual intercourse, close to significance (U = 77.0, p = 0.06), sexual satisfaction (U = 56.0, p = 0.008), body image (p=0.084), and expectation for a change in the quality of sex (p = 0.003).

**Discussion**

The present study examined differences between Arab and Jewish women with morbid obesity who were candidates for bariatric surgery in regard to certain sociodemographic and cultural characteristics. Their impact on perception of sexuality and social participation in daily lives. Many studies have examined the effect of obesity on sexual and daily functioning. However, to our knowledge this was not examined in Israel, in particular, not the cultural difference between the two ethnic groups.

 Our study found that the body image and sexual functioning of all the women involved were compromised in both ethnic groups before embarking upon surgery. These results are in line with previous studies of Markey, Markey & Birch (2004), in their work on women's self-satisfaction. They showed that body weight has a significant effect on self-image. Body image is an integral part of self-esteem, and is component affecting mental states through which people evaluate themselves.

 In modern society, much emphasis is given to external appearance and dimensions. Satisfaction with external appearance, like the satisfaction with expressions of the "self" on other levels, is a necessary precondition for enjoyment of a relationship and sexuality. A person who is dissatisfied with his/her outward appearance will most likely be unable to make room for fantasies and pleasures (Kurtz, 2010).

 Every society perceives the body and sexuality in a unique manner. In Islamic culture the purpose of the female body is to provide pleasure to a man and to produce off springs. The woman is expected to be a virgin before marriage, not only in body but also in mind. She is expected to embark upon a relationship with her husband without previous sexual, physical or emotional experiences (Saar, 2004). A woman becomes a sexual object and is defined by the experience of a man. The woman's body is in a constant state of external criticism and the women is required to take responsibility of her body and its appearance (Bordo, 2003).

 Several studies have demonstrate a link between BMI index and sexual functioning and that obesity impairs sexual functioning and quality of sexual relationship (Kristine et al, 2017). In our study, we found that the BMI in both groups was high (over 40). The difference in level of education between the Jewish and Arab women was not statistically significant, but the difference between the groups in rate of employment was statistically significant. Each of these components impacts the individual's self-image and his/her social attitudes and participation. In a study by Bond (2009), it was noted that about 60% of female candidates for bariatric surgery reported a decrease and difficulty in sexual functioning. Similarly, Kinzl and colleagues (2001) found that over 50% of obese women reported problems with sexual functioning. In Our study we found a low overall level of sexual functioning in both groups, with no difference between them (59% of Jewish and 60% of Arab women reported a decrease in sexual desire). Arab participants were found to be less likely to initiate sexual relations and less satisfied with sexual relations than Jewish women. Cultural differences and differences in social norms can explain these results.

 In our study, no statistically significant difference in mean BMI values between the two study group was found. Boker (2005) examined the rate of obesity in Israeli Jews and Arabs. Her study shows a significantly higher rate of obesity (BMI ≥ 30) in Arab women compared to Jewish counterparts. However, Sample size and a lack of significant difference in mean years of education in our study may explain that no difference in body mass was found. Boker's (2005) study also found that the BMI value was dependent on the years of education in women and men. Differences in the relationship between BMI value and level of education were noted as being higher in women, with basic education vs. those with an academic education. One of the cultural characteristics associated with obesity is the psychological characteristic that may coincide with the level of education. For example: the self-discipline necessary for acquiring a good education, self-restraint in food intake and self-discipline in an exercise program - these abilities are affected not only by genetic factors but also by one's environment and culture (Johnson, 2011).

 It is important to portray the weakened place of women in Arab society. "Family dignity" is a dominant principle utilized as a tool for social control, especially women's sexual behavior. There is a large set of (central) values surrounding the control of a woman's body - respect, and especially family honor, shame and modesty, all for the purpose of preserving the patriarchal family. This, in turn, extends to prohibitions imposed on women in the sexual sphere, negatively judging any social contact with a man outside the family circle as an act to be avoided. "What will the people say" and "damaging our good name" are tools for social supervision, used to punish the woman in case she deviates from normative behavior (Mernissi, 1996). This set-up organizes social behavior and acts directly upon a woman's body, her thinking and her emotions, and therefore, on her behavior. This finding may explain the decline in sexual function with respect to the perception of the partner, and further clarify the difference in sexual function between the two ethnic groups.

 Karkabi-Sabah (2009) sees the status of Arab women in Israel as an expression of their belonging to Arab society in the Middle East, on the one hand they are characterized by a traditional conservatism of gender inequality as an expression of patriarchal dominance, and on the other they are influenced by social and cultural change occurring in Arab society. In Israel, these processes are particularly prominent, as the encounter with the culture of the Jewish majority, inclined to the lifestyle and culture of the West, is pervasive. Changes in the status of women in modern Arab society may explain the lack of statistical significant differances in sexual function between Jewish and Arab women.

 The changes mentioned above characterize the modernization that Arab society is currently undergoing, which may reinforce the research findings that the level of social participation among Arab women was lower than among Jewish women. Traditional Arab society in Israel is undergoing a process of 'selective modernization' in which an ethnic minority, characterized as a traditional society, adopts and assimilates some of the values ​​of the majority population while preserving parts of the values ​​and norms of its tradition. This creates a balance between cultural influences and patterns outside and inside the society, and between old and new elements (Ahtilat, 2018). Differences in leisure patterns between the two cultures still exist. Arabs read fewer books, frequent theater, cinema and the beach less often, and engage less in sports: However, they spend more time with their family and on picnics outdoors as found in our research and other studies (Yaar, 2001).

 From the demographic data of the present study, a statistically significant difference can be seen between the proportion of employed Jewish women (91%) and Arab women (69%), even though no difference was found between the two groups in their level of education.
In recent decades the level of education of Israeli Arab women increased , especially higher education. Similarly an increase in the proportion of employed Arab women, though it is still lower than that of employed Jewish women (Ahtilat, P. 2018). General enrollment rates of the Arab population in higher education institutions has risen, primarily due to the increase in female Arab students. In 2014, about half of Jewish women between the ages of 30-33 had an academic degree, and a similar proportion was found in Christian Arab women. The proportion of degree-holding women from other sub-groups was lower: 23% of Arab Muslim women, 19% of Druze women, and 16% of Beduin women. In contrast to the significant improvement in education level, the increase in employment among Arab women is much more moderate. The proportion of Arab women employed is quite low, compared to Jewish women and compared to women in other OECD countries. The proportion of working women in the Arab sector between the ages of 25-54 rose from 21% at the turn of the 21th century to 35% in 2016, but is still lagging far behind the rate of employed Jewish women (Fox, 2018).

 Normal memory level more prevalent among Jewish women. However, we found no association between memory level and BMI, employment or years of education. A study conducted by Gurneet and colleagues in 2017 noted that obesity rates were high in patients with severe mental illness as well as neuro-cognitive problems mainly in executive functions such as decision making, planning, problem solving and mental flexibility. Other studies have shown the negative effect of obesity on memory, language, psychomotor performance, agility, and visual perception (Gurneet, 2017). our study showed significant neurocognitive impairment in about 25% of the bariatric patients, and about 40% had a mild memory, attention, and language impairment. In contrast, other studies concluded that there is no correlation between obesity and cognitive function in women (Farooq et al, 2018), which reinforces the findings of our study that found no association between BMI and memory loss. Schwartz (2018) in a study conducted that examined the frequency of connections and cognitive health between Jews and Arabs in Israel stated that the prevalence of social connections not only affects cognitive health but also psychological factors ​​such as depression and mood. Cultural status can in turn affect the prevalence of social connections and cognitive functioning. In our study we found that Arab women are less likely to be employed and less likely to spend time in cultural events, which may explain the difference in the memory index between the two groups.

 In parallel with the cultural differences between the two societies and their impact on the female candidates for surgery, we felt a need to understand why these women opted for bariatric surgery. In a study conducted by Mariji and a colleague in 2004, the reason of women and men opted for bariatric surgery was investigated. They noted that 'external image' was that most indicated to a reason for surgery. In our study, 63% of Arab women and 48% of Jewish women cited external image as the main reason for surgery. In addition, 50% of Arab women and 31% of Jewish women cited sexuality as a reason for surgery. Kristine and colleagues (2017) noted that more than 40% of obese women in the United States reported difficulty in at least one aspect of sexual functioning, leading to emotional and physical problems. Self-perception includes aspects of body image, external image and emotional behavior, factors that affect a person’s quality of life and sexual behavior. This phenomenon is common in obese women. External image is associated with BMI, weight, and decreased sexual function. (Tim, 2018).

 Studies indicate that obesity is associated with specific environmental factors, such as socioeconomic status, stress, social barriers, and education level. In advanced societies, the rate of obesity is higher among people with low levels of education or socioeconomic status (Johnson, 2011). The change in women's employment patterns leads to changes in the status of women. Other researchers have contended that the changes that have occurred in Israeli Arab women are "quantitative" at various levels, mainly in education and going out to work, but are not basic "qualitative" changes that alter her status within the family or her relationship with her spouse (Ahtilat, P. 2018).

*Limitations and strength of the study:*

 The study was conducted in one hospital in northern Israel that serves the two populations, Jews and Arabs, both of whom reside in the same region. Thus, it may not reflect completely the character of the two groups. Therefor it may not reflects the general population. In addition to the existence of a division in Arab society according to religion, the study did not address specific subgroups (Muslim, Christian and Druze) or their place of residence (village, city) that may impact the findings. In our study, we did not address the husband's perception of his wife's body, though it is an important point in the cultural difference between Arab and Jewish society.

 Despite the limitations of the study mentioned above the uniqueness of this work is by emphasizing cultural aspects and norms that affect perception of body image, sexuality and participation in two ethnic groups.  However, the findings of our study (tables 3 and 6) also demonstrate that many basic human feelings toward body image are similar in the whole group, regardless of ethnicity or social status.

*Conclusions:*

 The present study compares obese Israeli women from two cultures candidates for bariatric surgery, with respect to body image, sexual functioning, social participation and memory loss. This cross-sectional study found a statistically significant difference in the BMI index, with Jewish women at a higher value than Arab women. Although there is a statistically significant difference in mean BMI value between the two groups, this difference is clinically marginal. However, Jewish women were more active in their sexual behavior than Arab women, especially in initiation of sexual relations and satisfaction with sex.

 Despite the lack of difference in years of education, there was a difference in percentage of employed women between the two groups. In addition, the memory index was lower among Arab than Jewish women regardless of their social participation, obesity, education or employment. The study reveals the differing cultural characteristics between Jews and Arabs, especially in the time of modernization that Arab society is undergoing. The findings of the study indicate the importance of cultural characteristics in shaping the social behavior and self-perception of obese women.

Disclosure of Interest The authors report no conflicts of interest

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