Prevalence of X–chromatin in Jordanian women

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ABSTRACT

Objective: This study was conducted to evaluate the distribution of X-chromatin among Jordanian women at different age groups. Results will be compared with other studies for possible racial and environmental effect on X-chromatin distribution.

Methods: Blood samples were drawn from all women subjected to this study by finger prick and stained with Wright's stain. X-chromatin positive polymorphonuclear cells were counted and corrected for percentage. Samples were taken during late 2002 and early 2003 from healthy women attending routine checkup in health centers in Northern Jordan.

Results: The number of X-chromatin was the highest (approximately 22%) in the <9-19 years age group and was the lowest (approximately 10%) ≥50 and above years age group. The number of X-chromatin was 14-18% in the other age groups.

Conclusion: These results were in accordance with other studies. It seems that the racial and environmental factors are ineffective on the distribution of X-chromatin in Jordanian women. These data could be used as reference for further studies.

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X-chromatin was first discovered in 1949 in female cat neuron. It also stated that interphase nuclei of mammals contain a sex-specific body found only in females.[1] This body was named as Barr body. Barr body is found in all female tissues except some cells of hematopoietic system.[2] A drum-stick mass within the nuclei of polymorphonuclear neutrophils of females was identified as X-chromatin.[3] It was named Davidson body.[3] Davidson body is a drum-stick in shape and attached by a slender chromatin stalk in the bilobed nuclei.[4] The discovery of these bodies opened new fields of study in the identification of sex in cases of intersex.[5-7] Many factors influence the prevalence of Barr body. The number of X-chromatin increases with age[8,9] and decreases after the menopause.[9] An inverse correlation have been demonstrated between the size of nucleus and the number of X-chromatin,[10] while a positive correlation have been shown between the cell size and the number of X-chromatin.[11] The prevalence of X-chromatin positive cells in patients with primary mammary carcinoma are more likely to respond to hormonal manipulation.[12] On the other hand, no correlation was found between X-chromatin count and the degree of malignancy of breast lobular neoplasm or invasive lobular carcinoma.[13] Supernumerary X-chromosome was found in 1% of more than 2600 school children, which was associated with abnormal delivery.[14] Prenatal sex determination has been achieved by detecting X-chromatin in exfoliated amniotic cells with validity of 97%.[15] Also, cases with anorexia nervosa were associated with low number of X-chromatin. This finding is proposed to be a marker for the development of anorexia nervosa.[16] In another study, no association has been found between anorexia nervosa and X-chromatin count.[17] Reviewed literature did not

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show any data concerning X-chromatin prevalence in Jordan. This study will help in revealing the pattern of X-chromatin prevalence among Jordanian women. The finding will set a standard reference for future studies. These findings could be used in identifying sex of the corpse. In the living, identification of sex is utmost importance in intersex cases when dealing with inheritance.

Methods. Three hundred and thirty-one normal healthy females were randomly chosen from outpatient department in referral hospitals in Northern Jordan and subjected to this study. The age range from 5-85 years. Although menstrual cycle does not affect the X-chromatin distribution in menstruating women,[18] other studies have shown fluctuation in the number of X-chromatin in menstruating women.[19] To avoid any effect, if any of menstruation, blood samples were collected from menstruating women at 9-10 days of their cycles.[19] Blood films were prepared by spreading a drop of blood from each female and stained with Wright's stain. Drumstick (Davidson body) appeared deep purple in the nuclei of the polymorphonuclear leukocytes. For Davidson body, 200 cells were counted and the percentage was calculated. Analysis of variance was used for statistical test to detect the significant difference between the groups studied.

Results. **Table 1** illustrates the mean ± SD of the percentage of X-chromatin positive polymorphonuclear leucocytes in blood films of all age groups included in this study. The highest value was observed in <9-19 years age group. The number of X-chromatin was approximately 22%. This age group represents females never experience menstruation or get pregnant. The lowest value was ≥50 years age group. The number of X-chromatin was 10.45-9.60%. This age group represents the post menopausal women. On the other hand the number was 18.37-14.11% in the 20-49 years age groups. These age groups represent the child-bearing age. These women were exposed to various hormonal manipulations due to pregnancy and menstrual cycles.

There was no significant difference ($p \leq 0.0001$) between group 1, group 2, and between group 6 and group 7, while there was a significant difference ($p \leq 0.0001$) between group 2 and group 3, group 3 and group 4, group 4 and group 5 and group 5 and group 6. It was noted that the number of X-chromatin positive cells decreased by age.

Table 1 - Shows the 7 age groups included in this study. Values are expressed as means ± SD (N=331).

Groups	Age group	n	Mean ± SD	Range
1	≤9	26	22.15 ± 3.31	17-27
2	10-19	62	22.03 ± 3.13	16-28
3	20-29	80	18.73 ± 2.25	14-26
4	30-39	71	17.41 ± 1.89	14-24
5	40-49	36	14.11 ± 2.41	10-20
6	50-59	31	10.45 ± 2.19	7-14
7	≥60	25	9.60 ± 2.18	6-14

Discussion. The number in the age group ≤9-19 years showed the highest value in all groups in this study. Values decrease gradually in the childbearing period in the 20-49 years age group. Also, values show a further decrease in X-chromatin count in the postmenopausal women ≥ 50 years age group. Although low X-chromatin number was observed in newborn females,[20] the number increases to the highest figure then after. This may be related to factors affecting the development and growth (for example growth hormone) rather than the low sex steroid hormones at this age group. If this is the case, the decrease in sex steroid in postmenopausal women will supposedly lead to high figure of X-chromatin count rather than the low figure in this study. The decrease in number of X-chromatin in the childbearing period may be attributed to the interaction between fluctuating sex steroids during menstrual cycle and pregnancy. The effect of fluctuating sex steroids on X-chromatin count is debatable. At least, one study have shown variation in X-chromatin count with different phases of menstrual cycle.[21] On the other hand, no change has been found in X-chromatin count during menstrual cycle.[18] The lowest figure in the child bearing period could be due to fluctuating sex steroid hormones in this age group[22] or due to corticosteroids treatment.[23] Estrogen increases the DNA-depended RNA synthesis,[24] which may lead to the appearance of X-chromatin. The figures in the postmenopausal group were in accordance with values obtained before.[25] The low figure is best explained with low sex steroids in this age group. It is better to see the effect of estrogen replacement therapy on sex chromatin count before we make this conclusion. Due to the X-chromatin count in this study for different age groups was in accordance with other values in other regions, this will exclude the racial or environmental factors that may affect the X-chromatin count. In addition, the discrepancy in the studies that show or exclude the effect of

steroid effect on X-chromatin count or the hesitance of association of X-chromatin with anorexia nervosa[17,18] would not lend us a concrete evidence of such association.

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