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Letters to the Editor AMJ 2012 5, 8

Chronic exposure of metformin: Does it lead to male infertility?

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Dear Editor,

Metformin, one of only two oral anti-diabetic drugs in the 2010 World Health Organization (WHO) model list of essential medicines (the other being glibenclamide) is now being used to treat polycystic ovarian syndrome (PCOS), obesity, and pre-diabetes and gestational diabetes. Its use in the treatment of PCOS indicates that it certainly has an important role to induce ovulation, regularisation of the menstrual cycle and increment of insulin sensitivity. But there is still a lack of extensive studies on the effect of metformin on human male fertility.

A study by Naglaa et al showed that oral administration of metformin to both diabetic and non-diabetic rabbits resulted in a significant decrease in testicular weight, sperm count, sperm motility and serum testosterone with a significant increase in sperm anomalies and dead sperm percentage.¹ Naglaa et al has suggested that vitamin B₁₂ deficiency may cause decreased sperm count and motility as it is well established that chronic use of metformin is associated with 20-30% lower blood levels of vitamin B₁₂.¹ This hypothesis is further strengthened by the finding that vitamin B₁₂ supplements improve fertility in animals with abnormal sperm production.¹ In this way, Naglaa et al have questioned the justification for the use of metformin in a frame of a therapeutic strategy for diabetes due to its resulting impact on male fertility and also put forward probable reasons behind this.¹ Moreover, vitamin B₁₂ deficiency during pregnancy may induce irreversible damage in the germ cells of embryos and affect the maturation of spermatozoa. Chronic exposure of metformin induces DNA damage in mammalian cells² and also impairs the mitochondrial complex-1 activity which plays the vital role to maintain the normalcy of sperm motility.³

Metformin acts via induction of p38MAPK and there is also an established inverse correlation between progressive sperm motility and relative expression of p38MAPK. However, another study by Morgante et al has shown that the use of metformin is associated with a statistically significant reduction in insulin resistance and sex hormone-binding globulin levels, a statistically significant increase in serum androgen levels, and a consequent improvement in semen characteristics.⁴ At this point we are caught between a rock and a hard place as this is a little explored area.

Moreover, erectile dysfunction and retrograde ejaculation are very common complications of diabetes mellitus. If, by any chance, deterioration of the aforesaid complications and male infertility are somehow related to the use of metformin, it will have significant consequences on its widespread use. In a society where man is defined by his masculine attributes, impotence and infertility are very sensitive issues and such problems can cause severe psychological trauma to the patient.

In this predicament, an experimental study with robust methodology is highly needed in a clinical setting to have an out-and-out of knowledge whether there is any association between infertility in human males and chronic metformin use. Study on in vitro effects of metformin on human spermatozoa to observe cytomorphometrical changes, biochemical alterations and decrement of physical activities may specifically indicate that it is metformin directly, not any other factors (such as reduced blood vitamin B₁₂ level) that is the cause of infertility in males. In spite of the miraculous indications of metformin, if a definite association between metformin and male fertility is established this will present a big challenge to future diabetes management.

Sincerely,

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Factors affecting purchasing decisions of radiology equipment

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Dear Editor,

The growth of radiology equipment use for diagnosis of diseases, the changing needs of consumers, and the increasing awareness of suppliers of such needs and their efforts to meet these needs will result in success in the highly competitive markets of the present world. Knowing customers’ behaviour can help many radiology equipment suppliers to maintain their competitive strengths and employ more efficient strategies.¹⁻²

This study was conducted to examine the factors affecting the purchase of radiology equipment from the perspective of Drug and Equipment Purchasing Committee members of Tehran University of Medical Sciences Hospitals to provide a basis for the decision makers and large importing companies’ representatives to make the proper decisions and develop effective strategies.

To meet the above objective, 58 members were selected by simple random sampling. The required data was collected using a researcher-made questionnaire containing two sections: demographic data and data about the factors influencing the equipment purchasing. It should be noted that there are several influential factors in decision-making about purchasing. Among different models which have been used in previous studies on behavioural models of industrial consumers, four factors including quality, price, brand, and after-sale services, as the most important factors, were selected. The selected factors were finalised using the viewpoints of experts in the field of marketing and medical equipment. The used technique was Analytic Hierarchy Process (AHP) and analysing the data was done using Expert Choice 11.0 and SPSS17.0.

Table 1: Frequency and percent of sample participating in the study

Variable		Frequency	Per cent
Sex	Male	40	69
	Female	18	31
Age	21-30	9	15.5
	31-40	26	44.8
	41-50	14	24.1
	>50	9	15.5
Education	Diploma	1	1.7
	BSc	20	34.5
	MSc	18	31
	GP	10	17.2
	PhD	9	15.5
Experience	<5	4	6.9
	5-10	11	19
	11-15	14	24.1
	>15	29	50

In this study there were 40 males (69%) and 18 females (31%). Most of them were in the 31–40 age group (44.8%), had bachelor's degrees (34.5%) and were in the more than 15-year experience group (50%) (Table 1). Factors which had effects on purchasing radiology equipment included four factors and their priorities were determined by calculating their geometric means. The following results were achieved after making related calculations: factors affecting the purchase of radiology equipment included quality, brand, after-sale services and price among which "quality" was the most influential factor with the highest geometric mean (0.55) and "price" was the least influential one with the lowest geometric mean (0.08) (Table 2).



Table 2: Factors affecting purchasing decision on radiology equipments

IR	Priority	Weight	Determinant
0.06	1	0.55	Quality
	2	0.24	After-sale services
	3	0.11	Brand
	4	0.08	Price

Because of the complexity and uncertainty of decision making conditions and resource constraints, priority setting is very important for radiology equipment importers. Therefore, in the present competitive environment, those organisations, which distinguish their customers' needs and develop their strategies based on the needs, are successful.³ It is futile for organisations to develop strategies regardless of customers' needs.

In this study the above fundamental factors have important effects on customers' decisions about purchasing radiology equipment among which "quality" is the most important one indicating that it has a great effect on the population health and plays an important role in developing market strategies by radiology equipment importers. Because consumers purchase high productivity products, radiology equipment manufacturers and importers should be aware of their customers' needs and make decisions and hold related policies based on those customers' priorities and preferences.

Sincerely,

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