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ORIGINAL ARTICLE

Opinions and perceptions of Egyptian Urologists regarding Multipara metric Magnetic Resonance imaging of prostate

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ABSTRACT

Background: Multiparametric magnetic resonance imaging is the modality of choice in cancer prostate diagnosis particularly in elevated Prostatic Specific Antigen and previous negative biopsy.
This study aims to assess the opinions and perceptions of Egyptian urologists regarding Multiparametric magnetic resonance imaging of the prostate.
Methods: A cross-sectional observational study using a snowball sampling technique. One hundred and fifty urologists responded to the survey. The questionnaire consisted of two parts; Socio-demographic characteristics and questions were used to evaluate opinions and perceptions about Multiparametric magnetic resonance imaging of prostate.
Results: Mean age (±SD) of respondents was 42.8 (±10.3) years old. Most participants 65 % worked in a governmental hospital. Regarding the experience of urology practice, most Urologists were 6-10 years (23%). Overall, 44 % of the participants had an Multiparametric magnetic resonance imaging machine in their workplace. Eighty-eight percent of respondents agreed with the utilize of Multiparametric magnetic resonance imaging prostate in organ-confined prostate cancer treatment and eighty-four percent strongly agreed or agreed that the utilize of Multiparametric magnetic resonance imaging could change the treatment approach of prostate cancer.
Conclusion: Most respondents prefer the use of Multiparametric magnetic resonance imaging in cancer prostate before the biopsy or repeated biopsies.
Keywords: Multiparametric magnetic resonance imaging, prostate, cancer.

INTRODUCTION

Magnetic resonance imaging (MRI) has a combination of anatomic and functional pulse sequences .Anatomic pulse sequences comprise T1 and T2 weighted mpMRI (T1W and T2W). T1W mpMRI is not indicated to detect lesions but to detect residual bleeding after biopsy. On T2W mp MRI, the anatomic details can be best detailed, especially in the axial plane. There are two types of functional pulse sequences: diffusion-weighted MRI (DW MRI) and dynamic contrast-enhanced MRI.

A DW MRI measures how water molecules are moving within a tissue, which can be limited in cancer-bearing tissues. In DW MRI, apparent diffusion coefficient (ADC) maps and high-b-value DW MRI are key components. The "b-value" refers to the degree to which an acquisition has been diffusion-weighted.

Dynamic contrast-enhanced MRI (DCE MRI) is used to determine the vascularity of the prostate to identify permeability changes that are related to tumor angiogenesis. It involves T1W gradient echo images acquired before, during and after injection of gadolinium-based contrast agents (GBCA) [1].

Multi-parametric Magnetic resonance imaging (mp-MRI) of the prostate has gained wide acceptance as a facilitating tool to enhance the detection and management of prostate cancer [1, 2].

Although it adds cost to the administration of prostate disease, mp-MRI provides a predominant anatomic orientation. Imaging focused on biopsy may expand the analysis of clinically noteworthy malignant growths by distinguishing explicit lesions not noticeable on ordinary ultrasound. The clinical signs for the utilization of MRI in the administration of prostate malignancy are quickly advancing [1].

To avoid unnecessary biopsies, it is strongly recomm ended to use multiparametric magnetic resonance im aging. When a biopsy is required, it should be a combination of targeted and systematic biopsies [3].

Surveys had evidence as a beneficial way of assessing perceptions, opinions, and practices of urologists regarding different subjects [4-6].

The aim of this work is to assess the opinions and perceptions of Egyptian urologists regarding the utilisation of mp-MRI prostate.

METHODS

This is a cross-sectional observational study to evaluate the opinions and perceptions of urologists regarding the use of mp-MRI prostate by using an online questionnaire. A snowball sampling technique was used. Egyptian urological association members were recruited for the study.

Data sources:

The questionnaire consisted of two parts. Part 1: Socio-demographic characteristics including age, place of work, years of experience, and how close is the nearest MRI prostate machine.

Part 2: Questions assess urologists' opinions and perceptions regarding the utilisation of mp-MRI prostate, for example, practical evidence supporting the use of mp-MRI prostate, differentiation of prostatic diseases, and mp-MRI targeted prostatic biopsies using visual registration technique. These questions were derived from a survey done by Manley et al [7]. **(Appendix 1).**

Data collection

An online semi-structured questionnaire using Google Forms was used to collect the data. A consent question was included in the questionnaire. The link of the questionnaire was sent through emails of Egyptian urology association members and Egyptian urologists' groups on Facebook.

The emails were sent to about 1600 Egyptian urological association members, from May 2020 to July 2020. We waited for 2 months after multiple reminders to Egyptian urologists' groups on Facebook to have a reasonable number of respondents, about 150 members responded to our study, with a response rate of about 9.4%, and then we started to collect the data. Once responding to the link, the participants were directed to the cover page describing the title, aim of the study, and written informed consent was obtained from all participants. After they agreed to participate in the survey, they were able to fill up the demographic data. Then survey questions about their opinions and perceptions about mp-MRI prostate use appeared consecutively, in which the participants answered all questions mandatory.

Ethical consideration

The study was approved by the research ethical committee of the Faculty of Medicine, Suez Canal University. The study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans. Online self-reported consent was included in the questionnaire, and it was gotten from all participants in the study. No rewards were used to affect the acceptance of participation in the questionnaire.

Statistical analysis

Collected data were analyzed using SPSS. Descriptive frequency distribution data was presented in tables and graphs. A Chi-square test will

be employed to assess if there will be a significant association between categorical variables. Linear regression analysis and General linear model (GLM) multivariate analysis will be employed to assess the difference in dependent variables and independent variables. A P-value < 0.05 will be statistically significant.

RESULTS

One hundred and fifty Egyptian urologists shared in our study. The mean age (±SD) of respondents was 42.8 (±10.3) years old. About 38.7% of respondents was in age group 35-44 years old, and 24% was in age group 45-54 years old. Regarding experience of Urology practice, about 23% of respondents had 6-10 years of experience, and about 21% of respondents had 16-20 years of experience. Most participants 98 (65 %) worked in a governmental hospital, 66 (44 %) of the participants had an MRI machine in their workplace (Table 1).

Eighty-eight percent of respondents agreed with the use of mp-MRI prostate in organ-confined cancer prostate treatment. Access to MRI limits its use in clinical practice and was strongly agreed and agreed by 16 % and 40 % of our participants. About 72% of all participants were strongly agreed or agreed that mp-MRI was useful in a patient with an elevated PSA or abnormal digital prostate exam before a biopsy. Besides, 91 % of participants were strongly agreed or agreed that mp-MRI was helpful in a patient negative biopsy and elevated PSA or abnormal digital rectal exam (Table 2). The significant predictor of total Likert scale perception score of participating urologists according to multiple logistic regression was the local availability of MRI machine in their workplace (P <0.05) (Table 3).

Our study showed that 84 % of our responders strongly agreed or agreed that mp-MRI could change our treatment approach for prostate cancer. Mp-MRI was used in all patients with active surveillance in 66 % of our participants as strongly agreed or agreed. While 34 % were strongly disagreed or disagreed on that. Fifty-five percent of our responders thought mp-MRI results were strongly correlated with the final pathology report after prostatectomy (Figure 1)

Table (1): Demographic data of participants (N=150)

Age	Mean (±SD)	42.8 (±10)	
		N	%
Age group	25-34 Years	34	22.7%
	35-44 Years	58	38.7%
	45-54 years	36	24%
	55-64 Years	18	12%
	65 Years and over	4	2.6%
Place of work	governmental hospital	98	65%
	private hospital	44	29%
	medical Centre	4	3%
	private clinic only	4	3%
Experience of urology practice	0-5 years	28	19%
	6-10 years	34	23%
	11-15 years	24	16%
	16-20 years	32	21%

	21-25 years	14	9%
	26-30 years	8	5%
	over 30 years	10	7%
Availability of MRI machine	In place doing MRI	66	44%
	<one hour	58	39%
	<two hours	14	9%
	>two hours	12	8%

Table (2): Responses to survey.

	Disagree	Cannot decide		Agree
There is practical evidence to utilize mp-MRI prostate to manage organ-confined prostate cancer.	2 (1.3%)	16 (10.7%)		132 (88%)
	Strongly agree	Agree	Disagree	Strongly disagree
Accessibility of MRI limits my capability to use it in my work	24 (16%)	60 (40%)	58 (38.7%)	8 (5.3%)
The expensive cost of mp-MRI interferes with its use	40(26.7%)	52 (34.7%)	54 (36%)	4 (2.6%)
	Strongly disagree	Disagree	Agree	Strongly agree
mp-MRI prostate is useful in differentiation of prostatic diseases	0 (0%)	16 (10.7%)	92 (61.3%)	42 (28%)
mp-MRI is useful in patients with increase PSA/abnormal digital rectal exam before biopsy	6 (4%)	36 (24%)	54 (36%)	54 (36%)
mp-MRI is useful in patients with negative biopsy and elevated PSA/abnormal prostate exam	4 (2.6%)	10 (6.7%)	70 (46.7%)	66 (44%)
mp-MRI guided prostatic biopsies of suspicious focal lesions are used in my work	16 (10.7%)	50 (33.3%)	48 (32%)	36 (24%)
mp-MRI is helpful before definitive treatment either prostatectomy or radiation	0 (0%)	14 (9.3%)	76 (50.7%)	60 (40%)
mp-MRI changes my approach of treatment for prostate cancer	0 (0%)	24 (16%)	78 (52%)	48 (32%)
mp-MRI should be utilized in all patients for active surveillance	4 (2.7%)	46 (30.7%)	68 (45.3%)	32 (21.3%)

	Never	Rarely	Sometimes	Often	Very often
How do mp-MRI guided biopsies changed to be positive	6 (4%)	2 (1.3%)	56 (37.4%)	60 (40%)	26 (17.3%)
	Weak correlation	Moderate correlation			Strong correlation
How closely do you think mp-MRI findings correlate with final pathology after prostatectomy	6 (4%)	62 (41.3%)			82 (54.7%)

Table (3): Multiple regression analysis of demographic factors and total score of responses:

Independent variables	Coefficient	Std. Error	t	P	$r_{partial}$	$r_{semipartial}$
(Constant)	65.1946					
Age	-0.05272	0.2122	-0.248	0.8045	-0.02968	0.02769
>20_YEARS experience	-4.5458	5.4148	-0.840	0.4040	-0.09984	0.09357
governmental_hospital_	1.4622	2.8987	0.504	0.6155	0.06018	0.05622
In_place_doing_MRI	6.9597	2.7533	2.528	0.0137	0.2892	0.2817
F-ratio						2.6261
Significance level						P=0.0417

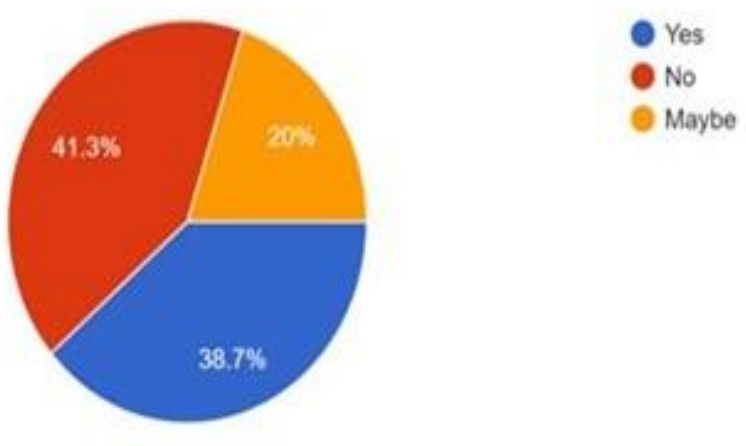

Figure 1: Do you recommend doing all the time MRI prostate prior-to prostatic biopsy to diagnose cancer prostate?

Appendix (1): Survey response Likert scale score

	Disagree	Cannot decide	Agree		
There is adequate evidence supporting the use of MRI prostate to manage localized prostate cancer.	0	1	2		
	Strongly agree	Agree	Disagree	Strongly disagree	
Access to MRI limits my ability to use it in my practice	0	1	2	3	
The high cost of MRI prohibits me for its use	0	1	2	3	
	Strongly disagree	Disagree	Agree	Strongly agree	
MRI prostate is helpful in differentiation of cancer prostate, Benign prostatic hyperplasia, and prostatitis	0	1	2	3	
MRI is helpful in patients with elevated PSA/abnormal prostate exam prior to biopsy	0	1	2	3	
MRI is helpful in patients with negative biopsy and abnormal PSA/prostate exam	0	1	2	3	
MRI guided suspicious focal lesions prostatic biopsies are utilized in my practice	0	1	2	3	
MRI is useful prior to definitive treatment with prostatectomy or radiation	0	1	2	3	
MRI changes my treatment approach of prostate cancer	0	1	2	3	
MRI should be used in all patients for active surveillance	0	1	2	3	
	Never	Rarely	Sometimes	Often	Very often
How do MRI guided biopsies turn out to be positive	0	1	2	3	4
	Weak correlation	Moderate correlation	Strong correlation		
How closely do you think MRI results correlate with final pathology after prostatectomy	0	1	2		

Total score was multiplied by 2.86 to have a scale score 0-100

DISCUSSION

Prostate MRI has been thoroughly investigated in the diagnosis of prostate cancer during the last years but not too many studies delineated the accessibility and accurate perception of mp-MRI prostate by surveying the Egyptian urologists.

Our survey found that 85% of respondents are encouraging the utilisation of mp-MRI prostate in managing localized prostate cancer according to the literature which is like the findings of Muthigi et al [8] that most respondents (87.6%) believed that mp-MRI and MRI targeted biopsy (83.6 %) are greatly advantageous in the evaluation of the patient with prostate cancer. Magnetic resonance imaging (MRI) of the prostate has facilitated the appropriate diagnosis and treatment of localized prostate cancer [1,2].

About 56% of our respondents strongly agreed or agreed that the feasibility of access to MRI limits its use in clinical practice. While 62% of participants strongly agreed or agreed that the high cost of MRI prohibits its use in clinical practice. Manley et al [7] also reported 59% of their respondents to feel that the cost of doing an MRI prostate is prohibiting its use and around 72% still feel that their use of MRI was affected by its lack of availability.

In another study conducted by Muthigi et al [8], they found that the most common causes for

not establishing the mp-MRI guided biopsy are the high cost and lack of infrastructure and they supposed that reducing the cost and availability of all equipment may help to increase the utilization of this technology.

Several studies had found that mp-MRI is useful in the evaluation of patients with negative biopsy, rising PSA, or abnormal digital rectal examination (DRE) and they recorded that repeat transrectal biopsies can miss clinically significant prostate cancer, especially in patients with anteriorly located tumors [9,10].

The PROMIS trial reported that the use of MRIs before prostate map biopsies could avoid 27% of biopsies and increase prostate cancer detection by 18% [11]. These findings agreed with ours as 72% of our respondents strongly agreed or agreed on the role of mp-MRI prostate in these patients, also 91% of our participants were strongly agreeing or agreeing that mp-MRI prostate is useful in patients with negative biopsy or elevated PSA or abnormal digital rectal examination.

On the contrary, Manley et al [7] reported that only 38% of all participants found MRI helpful in those patients and they explained these findings as most of their participants are not involved in the oncology training fellowship.

Many researchers have studied the efficacy of mp-MRI guided biopsy and they found it more beneficial through a direct, cognitive approach or fusion software. MP-MRI targeted biopsy of the prostate has shown to have high positive and negative predictive values for cancer prostate detection [12].

Many researchers have found that the mp-MRI /TRUS fusion-guided biopsy increases the detection rate of high-risk prostate cancer previously missed on 12-core sextant biopsies [13-16].

In our study, we found that 56% of all respondents strongly agreed or agreed on the usage of mp-MRI-guided biopsy while 44% disagreed with its usage. In agreement with our findings, Muthigi et al [8] found that most of their respondents believe that Prostate MRI 87.6% and MR-targeted biopsy 83.6% are greatly helpful in the assessment of Prostate cancer. While Manley et al [7] reported only 34% of respondents to use mp-MRI targeted biopsy and it is most used by respondents with oncology fellowship training.

Most of our respondents (84%) strongly agreed or agreed that MRI prostate could change the treatment approach while Manley et al [7] reported that only 38% of their participants found that MRI is beneficial in this capacity.

Manley et al [7] also reported that experienced surgeons who are operating more than 30 prostatectomies per year use mp-MRI for surgical planning more than another colleague's plan.

In agreement with our findings, Muthigi et al [8] reported 73.6% of their participants would use mp-MRI in staging before proceeding with radical prostatectomy. With respect to the utilization of mp-MRI in active surveillance in patients with prostate cancer, Manley et al [7] found that 25% of all respondents agreed with mp-MRI use in surveillance. This percentage was more in urologists with experience of less than 10 years 30.7% while in our study there were 66% of respondents strongly agreed or agreed to its use in surveillance. This could be explained, by our population being a younger age group and having experience of fewer than 10 years.

In our survey, almost 57% of respondents thought that mp-MRI-guided biopsies very often or often turned out to be positive while 37% thought that sometimes turned out to be positive. These findings are comparable to what Manley et al [7] reported in their study regarding the mp-MRI accuracy in diagnosing prostate cancer especially when comparing the patients with negative mp-MRI findings and underwent mp-MRI targeted biopsies they found 28% reported positive biopsies (often and very often) and 35% reported positive biopsies sometimes in the respondents.

Irrespective of much research that showed the high efficacy of mp-MRI, there is great doubt among the participants who thought that mp-MRI was moderately inaccurate and a little positive impact on patient care. We found that 55% of our respondents thought that mp-MRI results are strongly correlated with final pathology reports after prostatectomies, while Manley et al [7] reported that many participants felt that mp-MRI was inaccurate with moderate or poor correlation to final pathology reports

with minimal impact on patient's care. This could be explained by differences in interpreting and correlating mp-MRI findings by radiologists and pathologists.

The significant predictor of the total Likert scale perception score of participating urologists according to multiple logistic regression was the local availability of MRI machines in their workplace ($P < 0.05$). this finding supports the conclusion of Muthigi et al (8) that low-cost and easier access to MRI prostate may further increase its use in cancer prostate management.

The principal limitations of the study were bias and lack of information on non-respondents as the study was an online-based survey. A small sample of respondents due to poor response to the survey, and Urologist experience about utilization of MRI prostate biopsy were limitations of our study. Recommendations for further studies will be of value as this is the first time to do this study in Egypt.

CONCLUSION

Most respondents were in favour of the use of mp-MRI prostate in cancer prostate management before either the biopsy, repeated biopsies, or surveillance.

LIST OF ABBREVIATIONS:

mp-MRI: Multiparametric magnetic resonance imaging PSA: Prostatic Specific Antigen
TRUS: Transrectal ultrasound

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Competing interests

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Figure legends:

Figure 1: Do you recommend doing all the time MRI prostate prior-to prostatic biopsy to diagnose cancer prostate

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