

INTRODUCTION AND AIMS

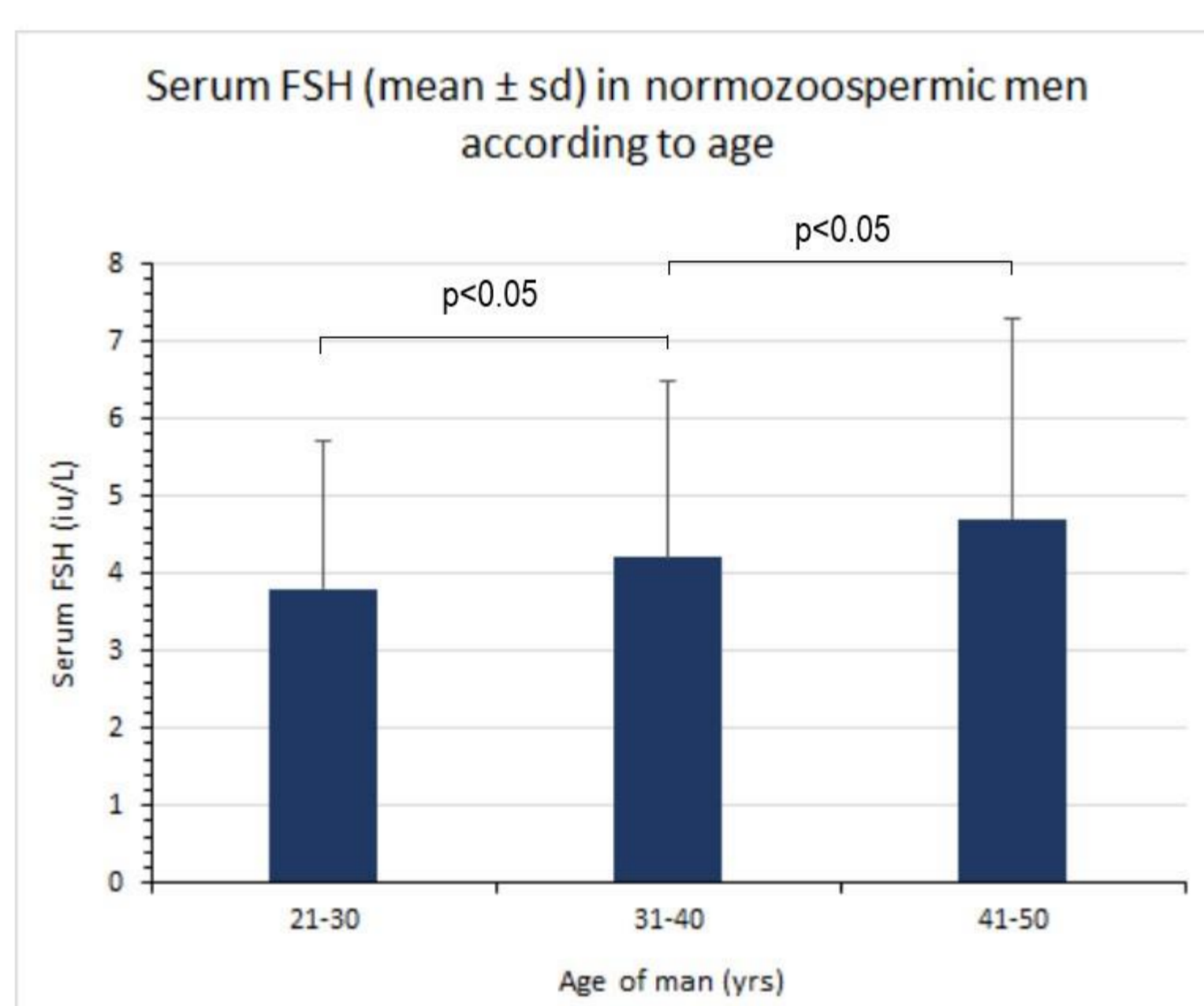
Male infertility is a global health issue, affecting an estimated 15% of couples globally, and males are found to be solely responsible for 20-30% of infertility cases and contribute to 50% of cases overall (1). Serum FSH is a commonly-used clinical marker of spermatogenesis (5) and interpretation requires a reference range derived from normal men. Reference intervals commonly use the central 95% of a healthy population (3). Nevertheless, it is important to take into account normally occurring alterations in physiology such as age-related changes (7).

This study aimed to (i) determine the effect of age upon serum FSH in normozoospermic men, (ii) derive an age-based reference range, (iii) apply this range to oligozoospermic and azoospermic men, (iv) validate the range on men with non-obstructive azoospermia (NOA), and (v) compare the performance with two other reference ranges.

REFERENCE RANGES

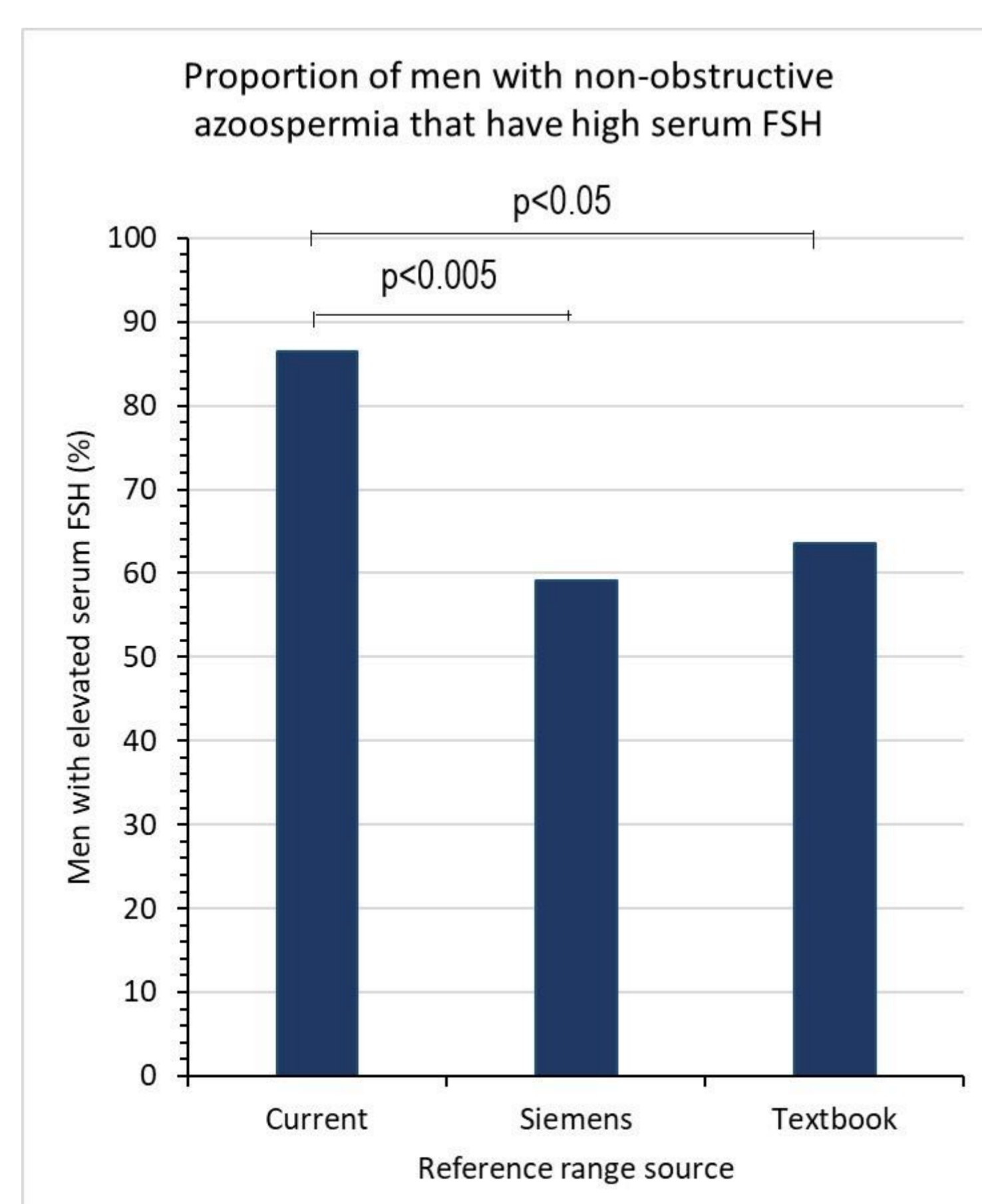
Source of reference range	Reference range
Current study (age-based)	21-30 yrs: 1.0 - 8.2 iu/L
	31-40 yrs: 1.4 - 9.5 iu/L
	41-50 yrs: 1.9 - 12.0 iu/L
Siemens IFU (6)	1.4 – 18.1 iu/L
Textbook (4)	1.4 – 15.4 iu/L

AGE AND SERUM FSH CONCENTRATIONS



The serum FSH is significantly affected by age ($F=8.3579$; $p<0.0005$), with significant differences between the 21-30 yrs vs 31-40 yrs groups, and the 31-40 yrs vs 41-50 yrs groups (both $p<0.05$). The central 95% centiles were calculated as a reference range and are shown in the table above.

FSH AND MEN WITH NOA



Significantly more men with NOA were identified as having high FSH levels when using the current age-based reference range than when using the other two sources with only single reference ranges.

MATERIALS AND METHODS

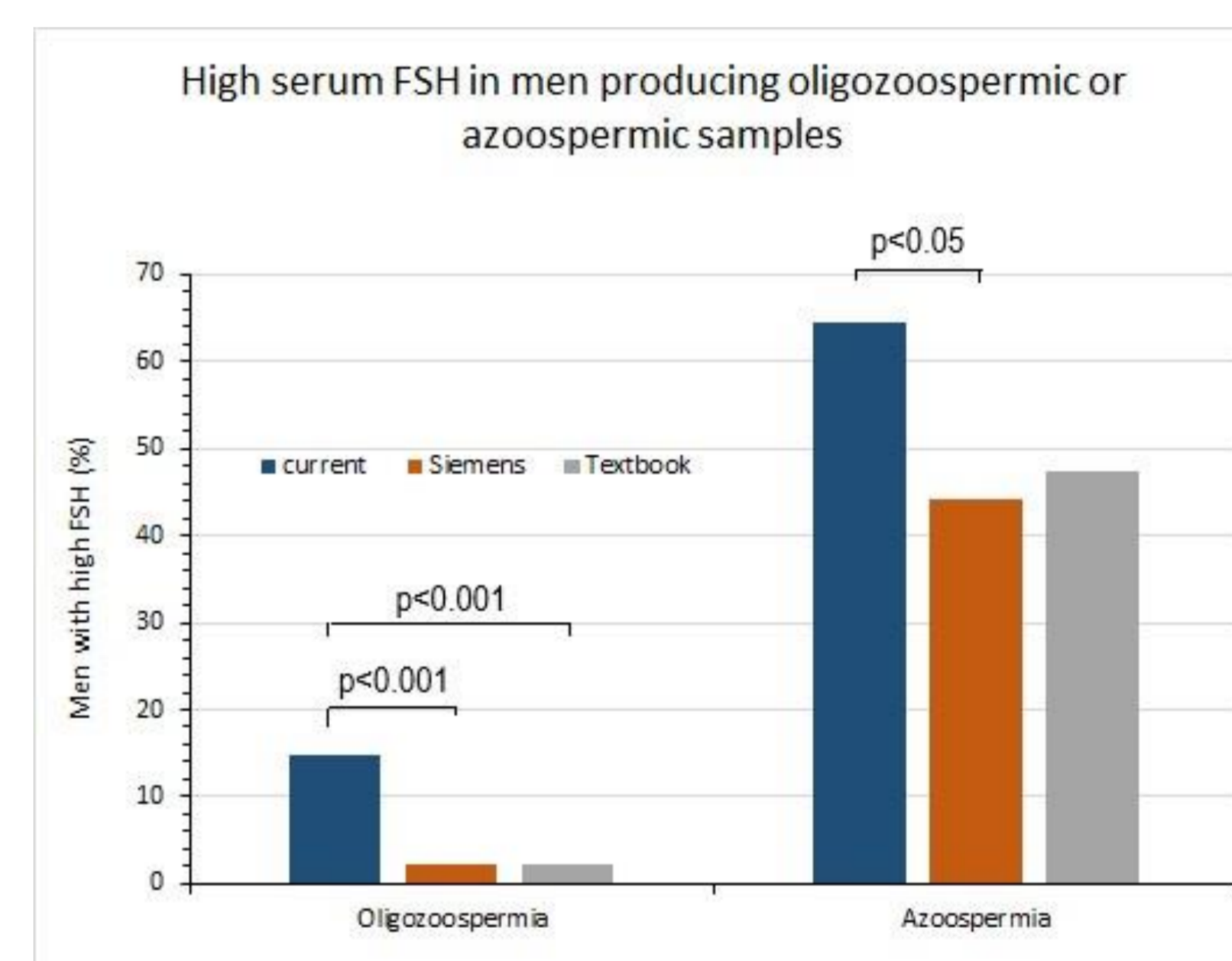
1190 Men aged 20-50 yrs attending the clinic for the first time had blood and semen analysed, and the age and semen parameters of the population is described below. Serum FSH was measured on a Siemens Centaur XP analyser and the results for 1037 normozoospermic men (WHO 5th Edition criteria) were analysed for the effect of age (ANOVA with post-hoc testing by the Holm method [2]).

An age-based reference range was determined using the serum FSH central 95% range. Comparison was made using χ^2 ($p<0.05$ significance level) with two other reference ranges: Siemens Information for Users [6] (single range of 1.4-18.1 iu/L) and the textbook Laboratory Medicine Diagnosis of Disease in Clinical Laboratory, McGraw-Hill Education [4] (single range of 1.4-15.4 iu/L). Men with NOA were identified by diagnostic criteria including genetic analysis and surgical exploration.

The age and semen quality of the 1190 men in the study.

	Semen quality		
	Normozoospermia	Oligozoospermia	Azoospermia
No. men	1037	94	59
Age (yrs)	35.5 ± 5.6	34.0 ± 5.5	35.9 ± 6.2
Sperm conc. ($\times 10^6$ /ml)	77.5 ± 52.9	8.3 ± 4.2	0
Sperm normal forms (%)	7 ± 3	5.7 ± 2.3	-
Sperm prog motility (%)	63.8 ± 9.2	58.3 ± 12.0	-

FSH, OLIGOZOOSPERMIA AND AZOOSPERMIA



Significantly more men producing oligozoospermic samples were identified with high FSH levels when using the current age-based reference range than the other two ranges. Also, more azoospermic men with high FSH levels were identified with the current age-based range than with the range of expected values provided by Siemens.

SUMMARY

FSH concentrations increase in men between 20-50yrs, and must be included in an age-based reference range. One such range identified more oligozoospermic men with elevated FSH levels than the ranges provided by either of two other established sources. It also identified more men having NOA with high FSH than the other two ranges.

REFERENCES

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